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USSR Report

MILITARY AFFAIRS

FOREIGN MILITARY REVIEW

No 12, DECEMBER 1985

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Except where indicated otherwise in the table of contents, the following is a complete translation of the Russian-language monthly journal ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, published in Moscow by the Ministry of Defense.

CONTENTS

GROUND FORCES

AIR FORCES

NAVAL FORCES

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FOREIGN MILITARY REVIEW

NATO MANEUVER FORCES IN EUROPE EXAMINED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 12, Dec 85 (Signed to press 11 Dec 85) pp 7-15

[Article by Col G. Petrukhin; "NATO Strike Forces in Europe"]

[Text] "The North Atlantic bloc is the principal weapon of imperialistic aggression and adventure," as was emphasized at the 26th CPSU Congress. The cutting edge of its misanthropic policies is pointed at the Soviet Union and the other countries of the socialist fraternity.

NATO is carrying out open preparation for war: constantly turning out nuclear and conventional weapons, intensely developing various plans for unleashing and conducting war, widening the militarization of the member nations, constantly increasing military appropriations, and improving the infrastructure.

Even in peacetime the so-called zone of responsibility of NATO is divided into theaters of war and combat activity, within whose boundaries there are actively functioning corresponding commands and staffs deployed and trained for large-scale combat activities of major groups of ground and naval forces.

In particular, the "zone of responsibility" of the NATO Supreme High Commander in Europe (SACEUR) includes territory of European member nations (not including Great Britain and Portugal) and Turkey, as well as the Mediterranean basin. France, as well as Spain, having left the NATO military organization, is not formally included in the zone of this command, but it bears responsibility "for the sanctity of their borders," as they love to dogmatically emphasize in NATO strategies. The military doctrine of France, for example, foresees, under certain conditions, participation of its armed forces in combined operations with the NATO armed forces.

SACEUR (headquarters in Kasto, 50 km southwest of Brussels) is the central link in the general structure of the military organization of the North Atlantic bloc. Here is located the largest (over 2 million personnel) and the most combat ready group of forces of the NATO countries. Three theaters of combat operations (TVDs) are subordinate to it--North European, Central European, and South European.

In NATO's militaristic preparations, special attention is given to the Central European TVD, which includes, according to data from the foreign press, the territory of the FRG (less Schleswig-Holstein), Belgium, the Netherlands and Luxemburg. About 85 million people live here, and, if France is included, which NATO strategies also are inclined to include in this TVD, almost 140 million, and the major economic resources of Western Europe are concentrated here.

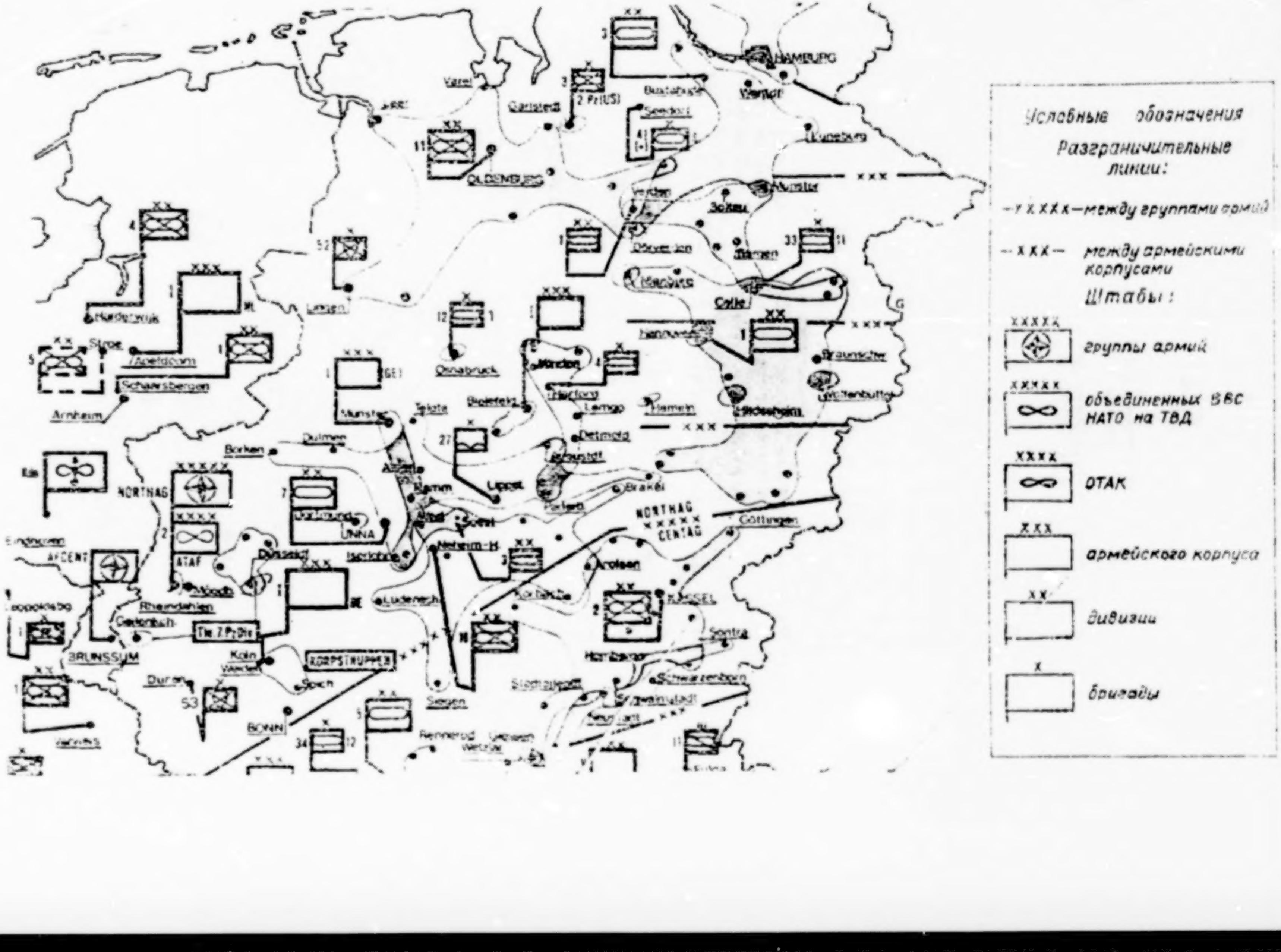
The FRG possesses the greatest military and economic potential in the TVD. This country's geographic location and the political course being carried out by the current government, which closely parallels the adventuristic policy of the American imperialists, as well as the strategic significance of its territory, allow the NATO command to regard West Germany as a convenient platform for delivering a blow to the socialist countries. There is a powerful group of bloc forces concentrated here, which is shown on the maps carried in the Western press (see pages three and four.)

Considering the economic, political, geographic, military and other factors which determine the great strategic significance of the Central European TVD in the overall NATO system, the bloc command maintains there the strongest and best equipped (with modern weapons) group of forces. Under the myth of the "Soviet military threat," year in and year out, in accordance with the so-called NATO infrastructure program, new bases and stocks are created, existing ones are rebuilt, lines of communication and pipelines are laid, and major stores of materiel are established on the territories of the countries of this theater. In U.S. and NATO strategists' opinion, it will be in this theater that the outcome of imperialist preparations will be decided in a future war on the continent.

In 1951, a command was set up to directly supervise NATO armed forces in the Central European TVD. At the present time it is commanded by a representative of the Bundeswehr. On a daily basis it maintains control over the buildup of the armed forces, operational and combat training of its forward-based units and formations, assumes direct control of these forces upon heightened tensions and during the conduct of training exercises for major organizations of the bloc armed forces.

Subordinate to the commander of the Central European TVD are a deputy and a staff (Brunssum, the Netherlands), as well as the commanders of two Army Groups and Air Force formations, which in time of combat must lead their respective groups of forces.

Joint ground force formations include 23 divisions, independent units and subunits of various arms and services, separated into commands of six countries (USA, FRG, Great Britain, Belgium, the Netherlands, and Canada). A majority of these organizations, stationed in the TVD, according to the "forward defense" concept, are located in regions directly bordering the GDR and Czechoslovakia. In fact, the entire territory of the FRG has been turned into a staging area for attack against the countries of the socialist fraternity employing the huge group of bloc forces already deployed in peacetime and equipped with the most modern military technology.


Условные обозначения
Разграничительные линии:
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Штабы:
группы армий
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ОТАК
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дивизии
бригады
HAMBURG
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NORTHAG
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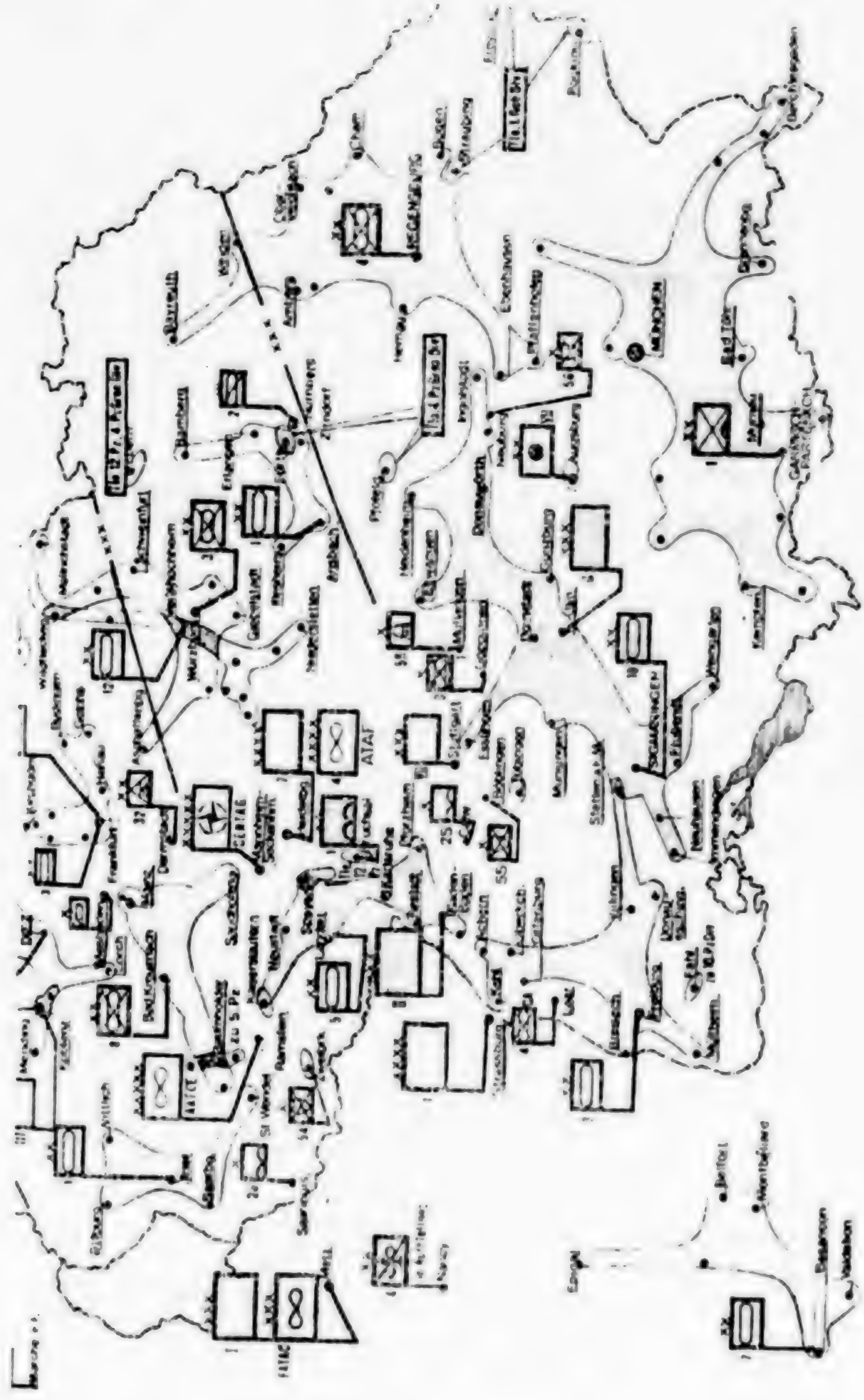
REGENSBURG
MÜNCHEN
CENTAG
ATAF

The formations and units of the ground forces in the TVD are organizationally combined into two major groupings--the northern (NORTHAG) and central (CENTAG) army groups. Boundaries between them extend along the line Gottingen (FRG)--Liege (Belgium). The area of responsibility of this TVD is bounded on the north by the Elba River.

NATO Joint Air Force force formations in the TVD consist of American, English, West German, Belgian, Dutch and Canadian aviation formations and units. Organizationally, they are combined into two (2nd and 4th) allied tactical air forces (ATAF), which are subordinate to the combined NATO air force command for this TVD (headquarters at Ramstein). The commander of the latter simultaneously commands the central region of the combined NATO air defense system in Europe, and the commanders of ATAFs, the 2nd and 4th air defense regions, respectively. It is believed that single command of strike aviation, fighter-interceptors, ground air defenses and air reconnaissance ensures the flexibility and effectiveness of their employment and concentrates the main force in the most important place.

According to NATO leaders' views on the employment of tactical aviation, upon accomplishing missions supporting the group of bloc armed forces in the TVD, an ATAF commander should organize and support close cooperation with the headquarters of the army groups, who are conducting combat activities in their sectors. In the Central European TVD that would be 2ATAF-NORTHAG and 4ATAF-CENTAG.

NORTHAG includes four corps with 12 divisions and independent units from Great Britain, FRG, Belgium, the Netherlands, and the U.S. There are 220,000 personnel assigned to this formation, and it has up to 3,500 tanks, about 2,000 field artillery pieces and mortars, over 500 nuclear delivery assets. NORTHAG HQ is located in Monchen-Gladbach (FRG). An English general is normally appointed commander of this group (who simultaneously is the commander of the British Army of the Rhine).

The 2nd ATAF contains the British air force in the FRG, the tactical aviation commands of Belgium and the Netherlands, the 3rd Aviation Support Division, and 4th Air Force Air Defense Division in the FRG, and part of the U.S. 3rd Air Force. The command's assets are based in the northern part of the FRG, in Belgium and the Netherlands, in other words, in the same area where NORTHAG is based. It comprises up to 700 combat aircraft, 36 PERSHING 1A launchers and over 400 surface-air missile launchers.

Dutch forces are deployed on NORTHAG's left flank basically comprise the 1st Corps (Apeldoorn). These include three motorized rifle divisions, with bases in Harderwijk, Schaarsabergen, and Apeldoorn, an independent infantry brigade, an independent LANCE missile battalion, two independent field artillery and three air defense battalions, and supply and service units and subunits. During peacetime, only one (41st) tank brigade (Seedorf) is deployed. The remaining formations and units are located on Dutch territory in a condition of readiness for completing a march of about 550 km and deployment near the FRG border. The corps right boundary, as reported in the foreign press, proceeds along the line Dennenberg-Munster. Corps peacetime strength reaches 35,000 and wartime--100,000.

The Netherlands Tactical Aviation Command (Soest), one of whose principal missions is to support the combat activities of the 1st Dutch Corps, includes 8 squadrons of army aviation (of which one is reconnaissance and one transport), 3 batteries of NIKE-HERCULES surface-to-air missiles, and 11 batteries of IHAWK surface-to-air missiles. All air bases are located on their territory (Wolkel, Eindhoven, Susterberg, Leeuwarden), but several batteries of surface-to-air missiles are in the FRG.

Dutch forces are equipped with up to 900 tanks (of which nearly 600 are LEOPARD 1s and 2s), 6 LANCE launchers, more than 800 field artillery pieces and mortars, about 600 anti-tank weapons, 70 helicopters, more than 170 combat aircraft, 23 NIKE HERCULES launchers and 36 IHAWKs.

West German ground forces in NORTHAG are represented by the 1st Corps (Munster), which in foreign specialists' opinion, is the most powerful organization in the Army Group. During peacetime it numbers about 106,000 and during wartime it is to expand to 170,000. It has one motorized rifle (Oldenburg) and three tank (Hannover, Buchstskude, and Unna) divisions, a LANCE battalion, an artillery regiment, an air defense missile regiment, two air defense artillery battalions, an anti-tank regiment, and two regiments of transport helicopters. The right boundary runs along the Weser-Elba canal.

The FRG air force in 2ATAF consists of the 3rd Aviation Support Division (Kalkar) and the 4th Air Defense Division (Aurich). The former includes four fighter bombers, one reconnaissance and combat training squadron, and a squadron of PERSHING 1A launchers. Aviation units are deployed in Nervenich, Hopsten, Husum, Oldenburg and Lek. The 4th Air Defense Division is mixed--one fighter squadron (Witmundhaven) and two regiments of NIKE-HERCULES and IHAWK.

Altogether, the West German forces in this region have 6 LANCE launchers, up to 1,200 tanks, more than 500 field artillery pieces and mortars, more than 1,000 anti-tank weapons (of which 800 are guided missiles), more than 2,000 IFVs and APCs, 36 ROLAND-2 missiles, 144 GEPARD anti-air guns, 56 anti-tank helicopters, 250 combat aircraft, 36 PERSHING 1A launchers, up to 290 NIKE HERCULES and IHAWKs. During training, the West German corps normally includes units and organizations of the Heimatshutz, in particular the 52nd Brigade (Lingen). The Western press states that it has a combat potential which nearly surpasses that of a regular motorized infantry brigade.

The British Army of the Rhine (BAOR) and the English Air Force Command constitute Great Britain's armed forces in the TVD. Even in peacetime they are deployed close to the borders of the socialist countries. The core of the BAOR (Rheinclahlen, 57,000 personnel, at the outbreak of war up to 150,000) is the 1st Corps, which includes a headquarters (Bielefeld), three armor divisions (Verden, Soest, Herford), an artillery division (Bielefeld) and other units and subunits. The right boundary runs from Goslar to Paderborn. The BAOR Commander, when tallying his combat strength, also counts a motorized infantry brigade stationed in West Berlin (3,000 personnel, 3 motorized infantry battalions). The corps is equipped with over 600 medium and more than 250 light (recon) tanks, 12 LANCE launchers, up to 250 field artillery pieces, more than 400 ATGMs, about 170 surface-to-air missiles, and nearly 15- helicopters, of which 70 are TOW-equipped.

The RAF command (Rheindahlen) consists of over 10,000 personnel, and includes 14 aviation and 4 defense missile squadrons. Units and organizations are stationed in Laarbruch, Bruggen, Gutersloh and Wildenrat. Aviation units include TORNADO-GR1 and JAGUAR GR1 tactical fighters, PHANTOM-FGR2 air defense fighters, and HARRIER GR3 VSTOL fighters (altogether about 170 combat aircraft and 32 RAPIER surface-to-air missiles). HARRIER GR3s can take off from field strips for rendering direct support to ground forces in the combat zone.

Belgian forces are concentrated along the NORTHAG right flank--the 1st Corps (Weiden, FRG) and the tactical aviation command (Evere, near Brussels). The 1st Corps has two divisions (Verviers, Belgium, and Neheim-Hustein, FRG), a LANCE battalion, three battalions of field artillery, two IHAWK battalions and two air defense artillery battalions, as well as combat and service support units. Many of the corps organizations and units are stationed in West Germany even in peacetime.

The tactical aviation command includes the following squadrons--combat, two-transport, one--helicopter, six--NIKE HERCULES, and other service units and subunits. Aviation units are stationed on their own territory, but surface-to-air missile organizations are in the FRG.

The Belgian forces are equipped with 6 LANCE launchers, up to 400 tanks, about 180 field artillery pieces, more than 200 anti-tank weapons, 40 IHAWKs, and 54 GEPARD air defense guns. The aviation command possesses MIRAGES and F-16s (altogether about 150 combat and 20 transport aircraft) and over 40 NIKE HERCULES.

In extreme circumstances, as emphasized in the foreign press, NORTHAG would receive reinforcing American forces from whom it is planned to form an American corps. At the present time, the 3rd Brigade, 2nd Armored Division (Garlstedt) is in the zone. The 32nd Tactical Fighter Squadron (about 20 F-15s, Susterberg, the Netherlands), belonging to the U.S. 17th Air Force, is subordinate to 2ATAF for air defense missions.

Additionally, it is planned to form new units on the territory of the FRG, Belgium, and the Netherlands and to transfer forces from other TVDs. Plans are to subordinate FRG territorial and border forces, stationed in this region, to NORTHAG.

American, West German, and Canadian ground and air forces are concentrated on the right flank of the Central European TVD, while French forces are in the southwestern region. In the course of operational and combat exercises, they closely coordinate with Joint NATO armed forces. The commander of French forces in the FRG, Corps General Ude, declared that training in recent years has been conducted with the goal of significantly increasing the possibility of conducting joint operations with the Bundeswehr. In his words, such closeness "is necessary to ensure the necessary merging of French forces into NATO operations in the event of a crisis."

Ground forces of this group comprise the Central Army Group, which includes 4 corps with 11 divisions, several independent brigades and 2 tank regiments. In

its armaments are included 48 Lance launchers, up to 5,000 tanks, about 3,500 field artillery pieces and mortars, more than 6,700 anti-tank weapons, and over 1,200 helicopters. CENTAG strength exceeds 300,000 American, West German and Canadian officers and soldiers.

The ground forces will be supported by the 4th Allied Tactical Air Force, to which American, West German and Canadian formations and units are assigned from their national air forces. There are about 900 combat aircraft, 36 PERSHING 1A launchers and up to 150 surface-to-air missile launchers in it. Air defense missile units from the American forces, concentrated in CENTAG's area, are also operationally subordinate to this command.

In the center of this group of forces are American formations and units which, in Western specialists'opinion, will be deployed in the region of Fulda, Weisbaden, Stuttgart and Wurnberg in a crisis situation. On their left it is planned to deploy the West German 3rd Corps (on the CENTAG left flank), and on the right the American 2nd Corps with Canadian forces.

American forces in the TVD possess the main NATO nuclear strength and are the most powerful of all the U.S. forces deployed outside the United States: two corps, a PERSHING brigade, the 32nd Air Defense Command (Army) and three numbered air forces. On a daily basis, they are subordinate to the Commander-in-Chief, Europe (Stuttgart). Command sections of the former 7th Army (headquarters in Heidelberg, shown on the map), as is known, were replaced by the U.S. Army in Europe (USAREUR), also located there.

The 5th (American) Corps (Frankfurt-on-Main) contains a mechanized (Bad Kreuznach) and armored (Frankfurt) division, an armored cavalry regiment (Fulda), separate LANCE battalions (three), 203.2- and 155-mm self-propelled howitzers, an army aviation group, and also service units and subunits.

The 7th (American) Corps (Stuttgart) consists of a mechanized (Wurzburg) and armored (Ansbach) division, a separate brigade from the 2nd Mechanized Division (Geppingen), a separate armored cavalry regiment (Wurnberg), separate LANCE battalions (three), 203.2- and 155-mm self-propelled howitzers, an army aviation group, and other units.

In the 56th PERSHING Missile Brigade (Schwebisch-Gmund), there are three battalions which are stationed in Schwebisch-Gmund, Neu Nem, Neckarzulm, and Heilbronn (FRG). At the end of 1985, all 3 of the battalions (108 launchers) stationed in the FRG, were converted to IRBM PERSHING 2s. One of the four batteries (three firing platoons, nine launchers) in each battalion is constantly on alert, deployed to launch sites. Others may be located at their permanent garrisons, in training sites or in maintenance. Since one of these must be in a high alert status, in Western specialists' estimate, it is possible to quickly double the nuclear firing strength of the brigade on site.

The 32nd Air Defense Command of USAREUR (Darmstadt) has subordinate to it battalions of NIKE HERCULES, PATRIOT battalions and IHAWK, CHAPPAREL gun and VULCAN missile battalions.

The 17th Air Force, whose headquarters is located in Senbach, FRG, 5 five fighter wings, 1 command wing, and several separate squadrons (including electronic warfare), altogether as many as 330 planes and 40,000 personnel. The main air bases of this organization are Bitburg, Hann, Spangdahlen, Ramstein, Zweibrucken, and Senbach.

The 3rd Air Force, based on the territory of Great Britain (Mildenhall), has a principal mission of delivering strikes in support of CENTAG. It includes three tactical fighter (F-111 fighter bombers and A-10 attack aircraft), reconnaissance (RF-4C) and tactical transport (C-130 HERCULES) wings.

The 16th Air Force, which could be employed in other theaters also, is stationed at Torrejon, Spain.

Altogether in the arsenal of the forces in the TVD, there number 108 PERSHING 2 launchers, 36 LANCE launchers, up to 2,000 tanks (up to 4,000 if those in storage are included), about 1,500 field artillery pieces and mortars, more than 3,000 ATGMs, up to 1,000 helicopters and nearly 730 combat aircraft.

The West German forces stationed in the southern part of the TVD include two corps, two air divisions, and service units and subunits.

The 3rd Corps (Koblenz) consists of a motorized infantry (Kassel) and two tank (Ditz and Feitshocheim) divisions, a battalion of LANCE launchers and other corps units. In its armament are 6 LANCE launchers, more than 800 tanks, up to 400 guns and mortars, more than 690 anti-tank weapons, 1,200 IFVs, CFVs and APCs, and 56 anti-tank helicopters.

The 2nd Corps (Ulm) is intended to be employed in conjunction with Canadian forces on the right flank of the TVD. It has a motorized infantry (Regensburg), tank (Siegmaringen), mountain (Garmisch-Dartenkirchen) and airborne (Bruchsal) division (the last will operate in brigades with the corps), a LANCE battalion and service units (altogether about 80,000 personnel). The corps arsenal includes 6 LANCE launchers, more than 800 tanks, over 500 guns and mortars, about 1,000 anti-tank weapons and other combat equipment.

The FRG air force in this region includes the 1st Aviation Support Division (Lautlingen) and the 2nd Air Defense Division (Birkenfeld). They total 36 PERSHING 1A launchers, 230 combat aircraft and almost 150 NIKE HERCULES and IHAWK. Main air bases include Lechfeld, Buchel, Memmingen, Pferdsfeld, Furstenfeldbruch, Bremgarten, and Neuburg.

Canadian forces have a mechanized brigade (nearly 3,200 personnel) and an aviation group at Lar. In its arsenal are more than 60 tanks, 24 155-mm self-propelled howitzers, 54 airplanes and 10 helicopters.

The French 2nd Corps (Baden-Oos) will be deployed in the CENTAG zone on FRG territory with its three tank divisions (Trier, Freiburg, Landau). Its strength is about 50,000 personnel. During wartime the Corps may be reinforced by one or two infantry divisions and support units.

To reinforce CENTAG, it is planned to activate the "South" territorial command and two border defense commands ("Center" and "South").

Foreign specialists believe that the Joint NATO armed forces currently deployed in the TVD may be reinforced relatively quickly by a call-up of reservists and introduction of additional formations and units from the U.S., Great Britain, Canada, and France, providing that the French political-military leadership decides to participate with the Joint NATO armed forces in combat. Therefore, one of the missions of the 1st French Army is to be prepared to participate in operations (battles) in a strategically important area as a part of CENTAG or independently.

In accordance with the agreement, "On Cooperation in Military Affairs," concluded between the U.S. and FRG, the Pentagon intends, at the start of crisis situations, to increase its forces in West Germany from four to ten army divisions. This means that 6 divisions (about 90,000 personnel) which are stationed in the U.S. in peacetime, must, in a period of 10 days, be brought to Central Europe. Heavy equipment for them is stored well ahead of time in European bloc countries (FRG, Belgium, and the Netherlands).

A significant strengthening of air forces in the TVD is also planned, for which European NATO countries must maintain some 700 airfields in constant readiness. For example, the U.S. itself is capable, according to statements by Pentagon officials, of transferring to Europe, in a 10-day period, about 60 squadrons, a major part of which will be used in the Central European TVD.

The Canadian Armed Forces plan to send to Europe three or four army brigades and two squadrons of combat aircraft, as well as a tactical group as a component of the mobile NATO forces.

One of the principal goals of American imperialism is to achieve victory in a nuclear war. To accomplish this nonsensical scheme, and to build up a strategic weapons system, new nuclear medium-range weapons are being modernized and deployed in Europe and plans are being brought forth for first use of weapons for the mass annihilation of people. Thus, SACEUR, the American General Rogers, frankly states that in the case of an outbreak of armed conflict, the North Atlantic Union has the right to employ first use of nuclear weapons.

Special attention is devoted to the build-up of nuclear missiles in Europe, the accelerated development of a reconnaissance-strike system, and to new types of precision guided conventional munitions.

Among the nuclear missiles are some with ranges of 1,000 km and more (not including ICBMs). When launched from the Central European TVD or from adjacent bodies of water, they are capable of striking important population centers in the USSR and other Warsaw Pact countries. Even before the start of deployment of the American first strike PERSHING 2 missile and cruise missiles (572 of them) in support of theater combat activities, the bloc command could activate more than 250 medium range nuclear-delivery platforms, including American (F-111, -16 and -4, A-6 and A-7 airplanes--about 650), English (64 POLARIS A-3 and AZTK SLBMs), French (44 MIRAGE-4 aircraft), 18 S-3 IRBMs and

96 M-20 and M4 SLBMs). They are capable of delivering 3,000 nuclear warheads to targets.

In case of war, it is planned to attach to the NATO European Command 5 U.S. ballistic missile-firing submarines with POSEIDON C3 missiles (80 missiles, each with 10 to 14 warheads). The majority of this firepower may be employed in support of the NATO Command in the Central European TVD.

Ground forces have in their arsenals the LANCE missile launchers, 203.2- and 155-mm guns, all designed to fire nuclear munitions. As the foreign press reports, on FRG territory alone there are more than 2,000 of these.

In addition to these weapons of mass destruction, the Pentagon intends to deploy on the territory of their allies in NATO, especially in the FRG, additional quantities of munitions, starting with poisonous agents. These barbaric plans are tendentiously self-justified on the necessity to conduct so-called "chemical rearmament." But the American overseas stores, especially Western Europe, at this time already contain 55,000 tons of highly toxic nerve gas agents. A broad program has been developed to produce new nuclear munitions for 203.2- and 155-mm guns, which, with the aid of special modules, are easily transformed into neutron weapons. They are also designated for deployment to Europe.

The North Atlantic command, having built up a powerful force in the center of Western Europe, attaches great importance to commanding them. The Supreme Allied Commander of NATO armed forces in the Central European theater commands his forces in peacetime through a headquarters, and in wartime, from command posts (CP) (stationary and mobile).

Foreign specialists consider that from the fixed protected command posts (Brunssum, the Netherlands, the commander will lead formations from a fixed CP in a time of conventional war, and from the mobile (reserve) CP during nuclear war. He also employs fixed protected NORTHAG and 2ATAF CP (Maastricht, the Netherlands) or CENTAG, 4ATAF (Kindsbach, FRG) as supplemental CPs, as well as the Allied Air Command.

Widesweeping militaristic preparations of the imperialist U.S. and NATO forces, and the acute exacerbation of the international situation which this causes, force the Soviet state realistically to evaluate the military threat and devote constant attention to raising the combat readiness of the Soviet armed forces. Together with the armies of the Warsaw Pact states, they vigilantly stand watch over the great conquests of socialism, are constantly combat ready, guaranteeing the rapid and effective repulse of an aggressor. "And until the threat to peace and security is removed, countries which are members of the Warsaw Pact will do whatever is necessary to protect themselves

from any encroacher," emphasized the CPSU's Central Committee general secretary, M.S. Gorbachev in his address "Undying Feat of the Soviet People," on 8 May 1985.

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ALLEGED U.S. MIDEAST MILITARY PLANS DESCRIBED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 12, Dec 85 (Signed to press 11 Dec 85) pp 16-21

[Article by Col O. Ivanov, Col V. Saneyev; "The Middle East in the U.S.'s Aggressive Plans"]

[Text] The events taking place in the Middle East are not isolated regional phenomena. They are connected in a direct way to worldwide precesses and they involve the most varied forces and exert an influence on the whole system of international relations, including those between socialist and imperialist states. This region today is one of the world's most dangerous hotbeds of war. The chief reason for this is the growing interference by the United States which tries to derive some benefit from the instability of the situation and which has declared the Middle East to be a zone of "vital interest."

The U.S.'s interest in the Middle East stems from a number of its unique features, chiefly its natural wealth, its geographical location which is important from a military-strategic point of view, and its growing political significance.

American transnational monopolies view the region as a major and profitable source of oil, whose reserves exceed 70 per cent of the non-socialist world's discovered petroleum resources. Each year 600-700 million tons of oil are extracted, of which more than 80 per cent is exported. The U.S. share of the Middle Eastern oil imports has reached 13 per cent (approximately 10 million tons) and continues to grow. The region also has very rich reserves of other raw materials. The capitalist countries obtain up to 20 per cent of their cotton and almost 25 per cent of their chrome ore there.

The Middle East is also an ever-expanding market for American arms. In 1985, the countries of the region accounted for 40 per cent (7.2 billion dollars) of the total amount (almost 17 billion) of agreements and contracts for arms deliveries and military assistance to foreign governments signed by the United States. According to the Western press this figure could rise to 7.4 billion dollars in 1986.

The Middle East is located at the intersection of very important routes connecting Europe, Asia and Africa and which are in direct proximity to the

southern borders of the Soviet Union and the other countries of the socialist community.

The region's political significance comes from the rise of its influence around the world, the broad development of the national liberation movements there, and the unstable situation in specific countries. For a number of years the Middle East has been the arena for a bitter struggle between the forces of national liberation and imperialism, which, to a large degree, influences the correlation of forces taking shape not only in this region, but in the world in general.

It is precisely these special conditions which are responsible for the heightened interest in the Middle East on the part of American imperialism which, along with its allies, endeavors to hinder in every way the sweeping liberation and revolutionary processes, to establish complete control to guarantee a permanent Pentagon presence in the area, and to create a threat along the southern boundaries of the USSR.

The U.S. military plans for the Middle East fit in with the Pentagon's strategy of "direct opposition" developed in recent years and such component elements as the concepts of "geographic escalation" and "strategic mobility." They call for waging war against the USSR and its allies in several theaters of military operations simultaneously and the ability to transport troops and other goods quickly from one TVD to another in order to reinforce previously deployed contingents of troops and naval forces for the creation of groupings. Therefore, in recent time, especially with the coming to power of the Reagan administration, American strategists began to devote greater attention to the politico-military aspects of their Middle East policy, viewing it as a likely theater of war. We are talking here about a correlation of forces favorable to the U.S. in order for Washington to carry out its policies "from a position of strength."

The Pentagon's militarist preparations find their expression in attempts to expand the American military presence in the region. The Pentagon succeeded in placing a battalion of the Rapid Deployment Force in the so-called "multi-national force" in the Sinai Peninsula, and E-3A AWACS aircraft in Saudi Arabia. The U.S. is trying to put the most important elements of the middle East's countries' infrastructore at its disposal, combine them into a unified complex and tie them in with the armed forces command on the continent, create a unified control system for its troops in the region, and equip them with the very latest equipment.

At the same time, the placement of U.S. troops in the region on a permanent basis, along with significant expenses for the military budget, has become all the more complicated aspects of the political plan. The U.S. must take into account the decreasing popularity of American bases even in countries with reactionary pro-Western regimes. Considering the mood of the popular masses, the ruling circles of these countries fear complications associated with the presence of U.S. troops in peace time. One of the Reagan administration's Middle East specialists confessed that "in order to remain in power, the heads of countries friendly to us in the region must continuously emphasize their independence from the United States. Of course, no one believes them,

however, these assurances are an important part of their domestic policy." The instability of the regimes co-operating with Washington is clearly attested to by the example of the shah's regime in Iran, whose fall deprived the U.S. of its most reliable ally in the Middle East and Near East.

The basis of the new approach to the problem of military bases on the territory of Middle East countries was laid out in 1981, by then former U.S. Secretary of Defense Brown and confirmed by the present Secretary, Weinberger. According to their explanations, the United States, along with creating permanent bases, acknowledged that it was more rational to focus attention on the use of local facilities in a country by American armed forces "in an emergency." From this it is obvious that the implication is that the level of "emergency" is determined by Washington and certainly not in the capitals of the states offering their facilities and territory.

These aims of Washington found their practical reflection in the creation of the "Rapid Deployment Force" and its formation at a CENTCOM base in 1983. Drastic steps were taken to expand access to military facilities on the territory of Middle Eastern countries included in CENTCOM's "zone of responsibility." Through generous financial presents and military aid (more than 1 billion dollars annually), the United States succeeded in exacting such "benefits" from Egypt. According to foreign press reports, its airspace, airfields, naval bases and ports are used at American's option by the "Rapid Deployment Force," to improve combat training in a Middle Eastern setting, work out transportation for the force from the continental U.S., and for activities to put pressure on progressive national movements. The corresponding American and Egyptian organs are trying together, through various channels, to create the impression that Egypt is supposedly following its past foreign policy, independent of Washington, bearing in mind that the too openly pro-Western policy of former President Sadat cost him his life and nearly placed the stability of the regime in Egypt in jeopardy. Officials were not sparing in their public announcements of Egypt's refusal to provide bases for the Americans, particularly at RAS Banas, on a permanent basis. Under the guise of this "Smoke screen," the U.S. Rapid Deployment Force got all it wanted in the country. The only thing for the Pentagon yet to obtain is legal recognition of its "privileges."

In addition to this, the United States concluded agreements with Saudi Arabia, Oman and Bahrain which, in effect, accord the use of bases in Riyadh, Thamarit, Masira, Khasab, Muscat, and El Mukharrakh to its armed forces. The capabilities of the operatonal weaponry in the territories of the Arabian Peninsula's countries having monarchist regimes have long exceeded the needs of the national armies. However, with the Pentagon's assistance, construction of new and modernization of existing military facilities continues. The U.S. government allocated 252 million dollars to Oman alone for this purpose. According to the American command's scheme, these facilities must become forward bases for deployment of interventionist forces in the Persian Gulf region "in the event of a crisis situation."

The American command is hurrying to utilize its access to Middle East countries' military facilities and step up the operational and combat training of the Rapid Deployment Force in the region itself. The size of the exercises

conducted there continually grows. Thus, while in 1981, a little more than 1,000 American servicemen participated in the BRIGHT STAR exercise, there were more than 5,000 in 1983, and in 1985, the number exceeded 10,000. The intensity of such measures is also increasing. The BRIGHT STAR exercise had barely ended when the unified central command and the Egyptian General Staff began a new major joint exercise on Egyptian territory.

Having enlisted Egypt, Jordan and Oman in the joint exercises, the U.S. views this step as one of the practical elements of carrying out its bloc policy in the Middle East. The Reagan Administration is nurturing plans to unite the region's pro-Western regimes under Washington's aegis, believing that anti-Sovietism is a sufficiently convincing reason for the Arabs to forget their differences with Israel and unite with her to fight alongside the United States against the mythical "Soviet threat."

Questions concerning the material and technical support of U.S. troop activities in the Middle East are a subject of special concern to the American military clique. Above all, they concern creation of necessary reserves of petroleum products, provision of food and water, and expanding local base capabilities for servicing and repairing U.S.-made military equipment. According to Rand Corporation publications, more than 1,300 tons of aviation fuel are needed each day to support the combat operations of just one wing of F-15 aircraft (each averages up to two sorties per day).

With this in mind, the United States requires that its Middle East allies establish strategic fuel reserves near major airfields which could be used by the American Air Force. They also encourage, in every possible way, the idea that Saudi Arabia deploy large floating stockpiles of petroleum products in the Black Sea and the Persian Gulf which would make these reserves less vulnerable in the event of war.

American companies and military specialists are actively participating in the development and creation, in Egypt and member countries of the Persian Gulf Cooperation Council, of an integrated automated system for air defense and material and technical support of the Air Force in order to further utilize them upon deployment of the Rapid Deployment Force in CENTCOM's "zone of responsibility."

Besides this, the United States attaches great importance to deliveries to Middle Eastern countries of American military materiel and the corresponding equipment to service it, using Pentagon specialists as an important factor in increasing the opportunity to use its own equipment in the event of combat involving the U.S. armed forces in the region. As a result of years of deliveries and military and technical cooperation with the aid of the Pentagon, the material-technical basis already exists in Israel, Saudi Arabia, Egypt and Jordan to service and repair M60 tanks, M113 armored personnel carriers, and F-4, F-15, F-16, and A-4 aircraft (airfields with the necessary equipment for these aircraft have been made ready as well) in other words, almost all the basic types of armor and aviation in the Rapid Deployment Forces' arsenal. The range of items being delivered is expanding. In the coming years, Saudi Arabia expects to purchase E-3A AWACS along with other weapons, and Egypt--the E-2C HAWKEYE, which it is expected American

specialists will service. In this way, a local base is established under American control at the expence of the Arabs for possible use by similar types of U.S. Air Force aircraft.

The actions of the United States and their allies in the region will lead to a further delay in the normalization of the Middles East conflict. Washington and Tel-Aviv are endeavoring at all costs to solve the region's problems without the USSR, separately, according to the Camp David model, and react negatively to the Soviet proposal to convene an international conference on the Middle East under the aegis of the United Nations, with the participation of all interested parties, including the PLO, as well as a number of other states, including the Soviet Union and the U.S.

U.S.-sponsored Israeli aggression against the Arab countries has not abated and threatens a new dangerous conflagration. Despite its difficult economic situation, Tel Aviv, in continuing its expansionist course, is pursuing the goal of creating a "Greater Israel" in the occupied territories. Efforts to create Jewish settlements on captured Arab lands are being carried out at a rapid pace. According to Western press information, they numbered 174 in 1985, of which 130 were on the West Bank of the Jordan River, 36 in the Golan Heights, and 8 in the Gaza Strip. The Israeli authorities have already confiscated 50 per cent of the Arab lands on the West Bank and 30 per cent in the Gaza Strip. Tel-Aviv's settlement actions are aimed at carrying out the political annexation of captured Arab territories.

In order to justify their territorial expansion, the Israeli Zionists resort to false arguments about the necessity of setting up "safe borders" for Israel and about the "right of the Jews to liberate age-old Israeli lands" on which the Jews lived in Biblical times.

Tel-Aviv ties the realization of these aggressive plans to the expansion and deepening of military-strategic cooperation with the U.S., whose military and econmomic aid to the Zionist state since the moment of its formation has exceeded 50 billion dollars. The greater part of these funds were presented in the course of the last few years. According to the admissions of American politicians, the U.S. Congress always favors Israel when approving aid to foreign governments. The influence of the Zionist lobby in Washington has been significant for many years and it has grown especially since the present administration came to power. Expressing his pleasure at Reagan's election victory, M. Begin, the Israeli prime minister, announced, "An American administration has never related so well to Israel."

Today, Tel-Aviv demands that the U.S. increase its military and economic aid for FY 85 and FY 86 to 4 billion dollars, i.e., by 60 per cent. In arguing for these tremendous appetites, Prime Minister S. Peres noted that the Americans spend 130 billion dollars on NATO and are still forced to keep their soldiers in Western Europe. Israel is committed to be a faithful guard for the U.S. in the Middle East for a much smaller amount.

The scope of U.S.-Israeli military cooperation is constantly increasing. Along with the expansion of arms deliveries, the U.S. utilizes Israel's infrastructure for the benefit of its armed forces for preparation for possible

joint combat operations, primarily in the Eastern Mediterranean. In the course of carrying out a memorandum of understanding concluded between the U.S. and Israel in 1981, the United States began to stockpile, on Israeli territory, stores of weapons, military equipment, POL, and ammunition, which could be used in a crisis by the American Rapid Deployment Force. The Sixth Fleet regularly calls on the ports of Haifa and Ashdod for repairs, resupply and leave. The military-technical cooperation calls for, in particular, the U.S. to turn over the latest technology for producing modern weapons and military equipment, and to participate in modernizing the nation's military industry. The agreement by the Pentagon to purchase Israeli-made weapons is one form of American aid to that country.

Israel's leadership acknowledges that a settlement of disagreements with the Arabs is possible through new separate deals. The chief aim of such deals is to split the Arab world and compel each state to capitulate in turn to Tel-Aviv's expansionist demands. This is just confirmed by the unchanging agressive nature of the Zionist state, whose expansionist policy is of a long-term nature and remains practically unchanged with the change of leadership. Only the methods and means may differ in relation to the evolving situation.

In foreign specialists' opinion, at the present stage, Israel is trying, with U.S. support, to galvanize the Camp David process and include primarily Jordan and the Palestines in separate negotiations. This poses a task for Israel to obtain recognition by Amman and the Palestine Liberation Organization. For this purpose, veiled references are being made as to Tel-Aviv's readiness to consider the possibility of creating some sort of Palestinian-Jordanian state unit, including the West Bank of the Jordan River (which Israel, in actuality, has absolutely no intention to give up). These calculations are based upon a lack of unity among the Arabs and intensification of the tendency for separate detachments of the Palestinian movement to drop out of active armed combat against Israel. Thus, a serious disagreement arose in the Palestine Resistance Movement (PRM) headed by the Palestine Liberation Organization (PLO) and in its largest faction, FATAH, on the question of tactics and ways to solve the Palestinian problem. Washington and Tel-Aviv considered the moment favorable for forcing the PLO to capitulate, disarming one of the most active units of the Arab national liberation movement, cutting it off from its allies and sowing the seeds of dissension among the Arabs. The Reagan administration unleashed feverish diplomatic activity among the pro-Western Arab regimes who began to urge the Palestinians into behind-the-scenes deals with Israel. Along with political measures, use is made of military pressure, right up to the organization of provocative armed actions similar to the attack on the PLO headquarters in Tunis on October 1, 1985.

The Jordanian-Palestine agreement on "a framework for joint action" signed in Amman on February 11, 1985, by pro-Western Arab regimes calling for negotiations with Israel on the creation of a Jordanian-Palestinian confederation in place of an independent Palestinian state was regarded as a departure from the legal demands directed at restoring justice and peace in the Middle East. Historical experience has shown that every step in the direction of capitulation to Israeli pressure only intensifies the aggressive nature of the Zionist state and leads to unleashing new major armed conflicts against neighboring Arab states.

The activities of imperialist forces in the region facilitate the perpetuation of a dangerous hotbed of tension in Lebanon, where the U.S. and Israel, having suffered defeat in military actions to suppress national-patriotic forces, have still not halted their attempts to undermine the unity and territorial integrity of the country. Armed clashes between opposing Lebanese groups and the terror of the Israeli military clique have not ended. Normalization of the situation in the country is opposed by right-wing Christian forces whose political program calls for the creation of a federative state, which, in Lebanon's situation, increases the danger of dividing the country and of new outbreaks of civil war. National-patriotic forces are pressing for broad constitutional, social, political and economic transformations. However, Tel-Aviv, with Washington's support, is trying to destabilize the situation in that Arab country in order to create favorable conditions for drawing her into a normalization according to the American-Israeli plan. That is why the continuation of internicine clashes is fraught with new complications which could be used by the imperialist forces as a pretext for intervention.

Trying to deepen the split in the Arab world and achieve the breakup of the complex problem of the Middle East into separate questions of bilateral relations between Israel and individual Arab countries, the U.S. is intensifying pressure on Syria and the PDRY (People's Democratic Republic of Yemen), which consistently follow an anti-imperialist and anti-Zionist policy. In this vein, most attention is paid to Syria, whose expanded military potential and political authority are a subject of special concern to Washington and Tel-Aviv.

A serious influence on the situation in the Middle East is exerted by the Iran-Iraq armed conflict going on already for more than six years. The U.S. views this as a factor aiding the escalation of the American military presence in the region. By intimidating the monarchies of the Arabian peninsula with export of the Iranian revolution and the fabricated "Soviet threat," Washington is trying by any means to turn the Persian Gulf Cooperation Council into a pro-Western military-political bloc, thereby hoping to strengthen its position in the region.

Under the guise of "defense" of the Persian Gulf countries and their oil in the event of the intensification of the Iran-Iraq conflict, the U.S. maintains a detachment of combat ships there and a carrier group in the Arabian Sea. They have deployed to the forward base Diego Garcia, a group of supply ships with weapons, combat equipment and material for a marine expeditionary brigade, whose personnel will be lifted from the U.S. to the CENTCOM zone by military transport.

In the Eastern Mediterranean, the United States is using its military presence as a means to attempt to influence the development of events in a favorable direction. Combat training is conducted here by the Sixth Fleet, whose size increases significantly when the situation in the Middle East is exacerbated. Large NATO naval exercises are regularly conducted in the region. Moreover, the American military clique is not opposed to using coastal Arab states' territory as a firing range for its weapons. Thus, aiding the Israeli aggressors in Lebanon, the U.S. Navy conducted "combat" tests of the

battleship NEW JERSEY, which shelled innocent Lebanese population with large caliber guns.

In this way, U.S. interference in the affairs of the Middle East, which was declared "a sphere of vital interest" by American imperialism, creates instability both in this region, as well as in the world in general. By using political, economic, and military pressure, hammering out military blocs, and speculating about the mythical "Soviet threat," the United States truly threatens the interests of Middle Eastern states, their place and security.

The Soviet Union decisively condemns Israel's aggressive policies which, with Washington's help, cynically flout all norms of international law. The USSR opposes attempts by Tel-Aviv's patron to substitute various versions of separate deals for a real search for peace, and steadfastly promotes the proposal to convene an international conference on the Middle East. Explaining the essence of our position on this question, the General Secretary of the CC CPSU, Comrade M.S. Gorbachev, announced at a meeting with the leader of the Lybian revolution, M. Khaddafi, during his visit to the Soviet Union in October, 1985, "We are for a conference for the simple reason that it is, in fact, the only sensible and effective way to put an end to the years-long war situation in the Middle East and to establish a lasting peace there. It should be achieved without further bloodshed, without intrigue and back-room deals one behind the back of another, with due attention to the legal interests of all interested parties without exclusion."

American politicians must not forget that the USSR will not remain indifferent to the events in the Middle East or in areas of direct proximity to its boundaries, and that it is able to guarantee its security and the security of its allies and friends.

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COMMUNICATIONS SYSTEMS IN ARABIAN PENINSULA COUNTRIES

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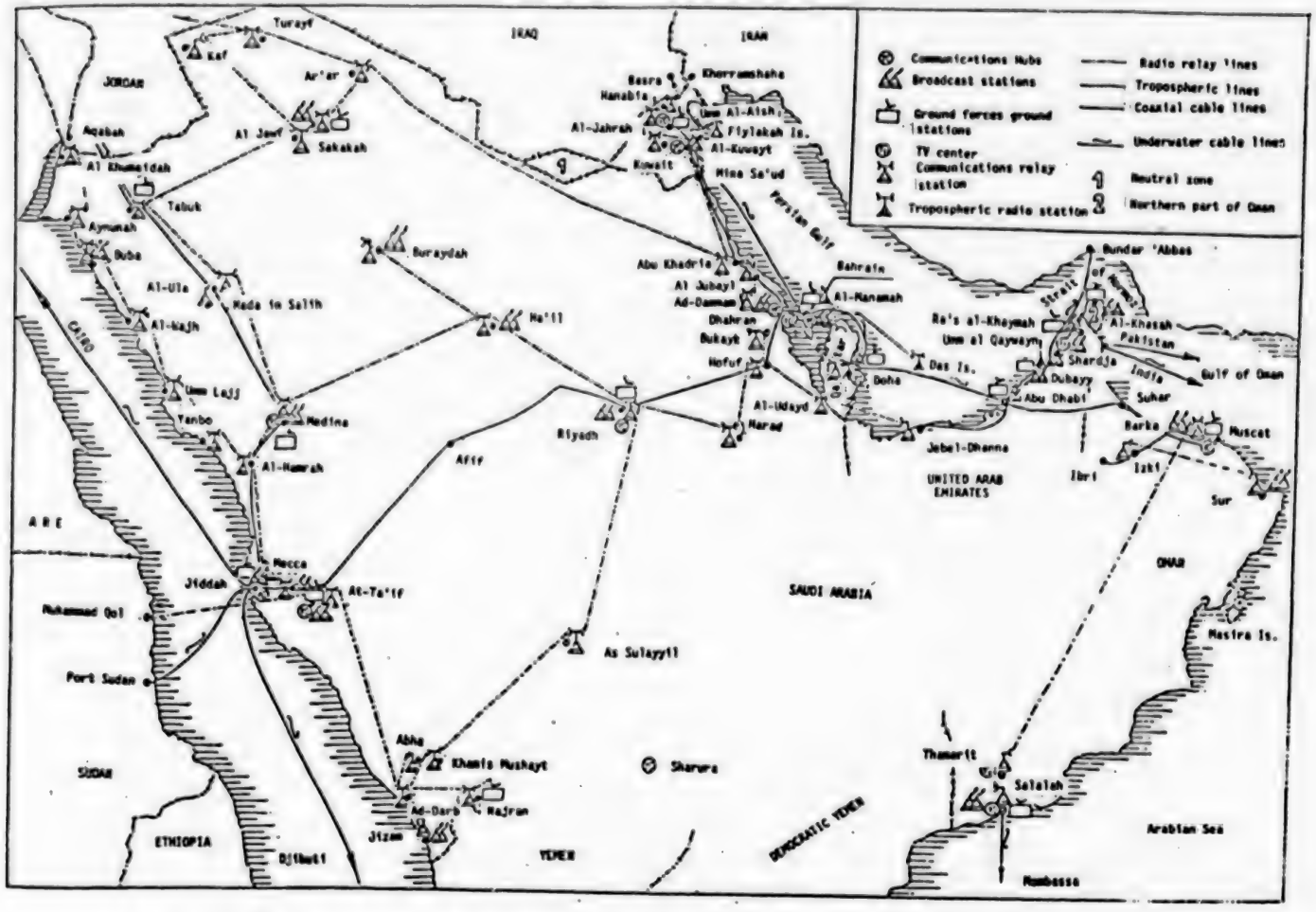
[Article by Col A. Kalgin; "Communications Systems in the Arabian Peninsula Countries"]

[Text] In the countries of the Arabian Peninsula that have taken the path of capitalist development (Saudi Arabia, Kuwait, Bahrain, Qatar, the United Arab Emirates, Oman), a great deal of attention is being paid to the development of communications, including satellite communications, involving West European and American commercial and military communications systems. This process was stimulated by the combined central command of the U.S. Armed Forces (CENTCOM) forming a "zone of responsibility" in January, 1983, that included the 19 countries of the Near and Middle East and East Africa. In the majority of these nations, particularly in the monarchies of the Arabian Peninsula, the Americans have created air bases, air defense systems, weapons and munitions depots, as well as developed communications assets.

Key efforts in this area by the U.S. and its NATO allies are directed at linking up the communications systems of the Arab countries to their own systems, getting international organizations involved with developing and improving communications in the region, and developing a regional system of satellite communications in the Middle East which will be under their complete control. All of these measures, in foreign specialists' opinion, will make it possible to increase the reliability and efficiency of the entire communications system in the region.

In the nations of the Arabian Peninsula, radio, radio-relay, tropospheric, wire, cable, and, in recent years, satellite communications are the most widespread. A diagram of the distribution of the basic communications facilities in these states is presented in Fig. 1.

In Saudi Arabia a branching system of radio, radio-relay, wire and cable communications has been created, and satellite communications have also been accorded a certain amount of development. In 1976, the Ministry of Post, Telegraph, and Telecommunications was formed.



Distribution Schematic of the Arabian Peninsula Countries' Communications Resources

Radio Communications. In many of the populated areas of the country there are radio stations. The largest radio communications transceiver centers have been developed in the capital Riyadh, as well as in the cities of Dhahran, At-Ta'if, Jiddah, Dammam and Medina. Radio and television broadcasting stations located in Riyadh, Jiddah, Daba, Jizan, Mecca, Sakakah, Burayda, Ha'il, Medina, At-Ta'if, Dammam, transmit in Arabic, English and other languages.

Radio relay lines were put into service in 1980. They permit multi-channel communications with airports, seaports and bases, military and military-industrial facilities, as well as among cities. The total length of radio relay communication lines is about 10,000 kilometers with a capacity of 90,000 channels.

The radio relay network involves more than 300 stations whose antenna towers have heights of up to 115 meters. In order to assure the normal operation of the Abgayg-Yanbu and Transarabian pipelines, radio relay lines extend along their path. Through the communications junction in At-Ta'if, the Saudi radio relay communications system gangs with the Sudanese system.

Tropospheric communications in Saudi Arabia are not extensively used. There are a few lines which connect the capital with administrative and economic centers located on the coasts of the Red Sea and the Persian Gulf as well as with neighboring countries.

Wire and cable communications. Wire (aerial) lines of communication are used, as a rule, to maintain communications within the country, and cable lines with neighboring states.

Telephone communications in Saudi Arabia are almost 100 per cent automated. The first automated telephone communications made their appearance in Jiddah in 1971. The telephone network, which encompasses more than 350 cities and villages, has more than 750,000 subscribers. In 1985, that number is anticipated to reach 1.2 million. More than 370 wire lines run through the capital, 290 through Jiddah, 240 through Mecca, and 120 each for Medina and At-Ta'if. The telex network is quickly developing in the country. There now number more than 18,000 telex machines.

There are several cable lines: Jiddah-Mecca (with a capacity of 120 telephone channels); At-Ta'if-Ar Riyadh-Hofuf-Dammam (length-1,360 km, capacity 1,200 channels); Jiddah-Medina (capacity 132 telephone channels); and, then, through Tabuk to Amman (Jordan). Communications between Saudi Arabia and Europe are particularly extensive as a result of laying a cable across the Red Sea into Sudan, Egypt and Djibouti. The cable which runs between the city of Dammam and Bahrain also has enormous importance to the country.

Satellite communications in Saudi Arabia are being accorded ever increasing significance. Their further expansion prompted the creation of seven earth stations for the INTELSAT satellite system in the cities of Riyadh, Jiddah, At Ta'if, Medina, Tabuk, Sakakah and Najran. The stations work via American satellites located in stationary orbits over the Atlantic and Indian Oceans. They permit telephone, telegraph, and television communications with many

countries of the world. It is further planned to build four more stations in the regions of Ha'il, Buraydah, Abha, and Jizan.

In Kuwait, qualitative and quantitative development of the national communications system has been assured, based on the modern Western European- and Japanese-made radio electronics technology. Its equipment is constantly being updated and permits it to be used in conjunction with the communications systems of the member nations of NATO. Satellite, radio, radio-relay, wire and cable communications are the most widespread forms of communication.

Satellite Communications. In order to expand their capabilities to provide reliable and stable long-distance communications with the countries of Europe, America and Asia using artificial earth satellites, Kuwait joined the international commercial satellite communications organization, INTELSAT, and later became a member of the international organization of maritime satellite communications, INMARSAT. The country has four satellite communications earth stations operating in the region of Umm-Al-Aish (71 km north of Al-Kuwayt. Three stations were built by the Japanese firm of Nippon Electric Company (in 1969, 1982, and 1983). Two of them (with a capacity of 276 telephone and two television channels) work through satellites located over the Indian and Atlantic Oceans and are part of the INTELSAT communications system. The third is a part of the INMARSAT system. The fourth station, built in 1977 by the West German firm of Siemens (capacity of 276 telephone and two television channels), works through a satellite put into stationary orbit over the Atlantic.

Radio communications in Kuwait are universally distributed and are characterized by their high degree of saturation. The largest centers for radio communications are located in Al-Kuwayt, Umm Al-Aish, in the ports and the airports. The country has built a radio broadcasting and two television centers. The number of radio receivers and televisions among the population exceeds one million.

Radio relay communications lines connect the capital with the key administrative centers, ports, bases, and petroleum extraction regions. The main lines are Al Kuwayt--Fiylakah Island, Al Kuwayt--Al -Jahrah, Al Kuwayt--Umm Al-Aish, Umm Al-Aish--El Hanabia--Basra (Iraq), Al Hanabia--Khorramshahr. The capacity of each line is about 300 channels.

The country's wire and cable network provides round-the-clock domestic and foreign communications. The telephone network includes more than 20 automatic telephone exchanges and covers all parts of the country. Direct communications links were set up with Great Britain (83) channels), the U.S. (32 channels), Italy (17 channels), and other countries.

Al Kuwayt is linked to the city of Dammam (Saudi Arabia) by coaxial cable. All state institutions and private firms are equipped with telex machines. The capacity of the international telex network amounts to 4,000 channels. Extensive development has been achieved in outfitting automobiles with radio telephones which operate from four stations (with more than 25,000 subscribers). In keeping with the long-term plan to develop communications by 1988, it is anticipated that the number of automobile radio telephones will

increase to 100,000 units and an underwater cable will be laid down to Bahrain.

Bahrain basically has radio, wire, and cable communications. In the area around the capital of Manamah, large-scale radio communications centers and radio broadcasting stations have been developed. In order to maintain stable international communications, two INTELSAT SYSTEM satellite communications ground stations of have been set up in Manamah (each with a capacity of 382 channels) that work through satellites located above the Atlantic and Indian Oceans. Antennae with diameters of about 32 meters have been erected at the stations. Radio relay and tropospheric stations have also been developed on the island, connecting it with neighboring states. Bahrain maintains tropospheric communications with the city of Dubayy (UAE, with a line capacity of 140 channels) and with Qatar (120 channels). The capital of Bahrain, Manamah, has telephone and telegraph communications with Kuwait through Dammam (240 channels). Work has been completed on laying down an underwater cable between Bahrain-Qatar-UAE that is 580 km long and has a capacity of 1,200 channels.

In Qatar the basic forms of communication are radio and wire communications. The largest radio communications centers, radio broadcasting stations, and television facilities are located in the region around the capital of Doha. International communications are maintained through two INTELSAT satellite communications system earth stations operating in Doha. Qutar maintains direct telephone lines with the majority of states on the Persian Gulf, Lebanon, Syria, Great Britain and the United States. A new automatic telephone exchange is being introduced in the capital with 30,000 phone numbers. Qatar is connected by radio relay line to Saudi Arabia as well.

Prior to 1970, the Emirates used an outmoded and ineffective communications system. After the formation of the United Arab Emirates (in 1971, in the course of six to seven years, this system was completely rebuilt. At the present time, all the Emirates have telephone, telegraph and telex communications. To manage the nationalized (in September, 1976) comunications system, the Emirates Telecommunications Corporation was established. The country has more than 49,800 telephone and 3,000 telex communications lines, and more than 150,000 telephones. Based on telephones per thousand population, the UAE occupy one of the first places in the Near East.

All radio and television stations are under the control of the Ministry of Culture and Information. The country has several radio stations distributed among the cities of Abu Dhabi, Dubayy, Sharjah, Umm al Qaywayn, and Ra's al-Khaymah. In 1977, a television network was completed that covers all the Emirates. The INTELSAT satellite communications system ground stations in Abu Dhabi, Dubayy, and Ra's al-Khaymah provide direct reception of television transmissions in color from a number of countries. The television facility in Umm al Qaywayn transmits in black and white.

Tropospheric communications stations are used to communicate with Bahrain. They operate in the city of Dubayy and on the island of Das. Furthermore, it is intended that coaxial cable lines be laid down to Dandar-Abbas (in Iran), Pakistan, and India.

Oman continues to develop its radio, radio relay, satellite and wire communications. The most important radio communications centers are operated in the regions around the cities of Maskat, Salalah, Thamarit and on the the island of Masira. The radio networks use equipment which is basically of English manufacture.

The country operates five INTELSAT satellite communications ground stations (two in Muscat, two in Al Khasab, the northern part of Oman, and one in Salal), which provide telephone and telex communications, televisions transmissions amd radio relay. In 1985, it is planned to build an additional station and replace the out-dated equipment in the existing ones.

The telephone network is expanding. In order to provide communications with outlying regions of the country, more than 20 automatic telephone exchanges have been installed for 22,000 subscribers. New radio relay lines have been laid down, providing communications between the cities of Maskat and Salalah, as well as with the oil-producing regions of the country. At the present time, more than 1,100 km of such lines are already functional. It is intended to build new exchanges for 25,000 phone numbers and lay down a coaxial cable with a capacity of 3,900 channels.

The armed forces of the countries on the Arabian Peninsula have their own lines and means of communication. They also make wide use of various civilian communications systems for their own interests. In recent years, primary attention has been paid to further developing satellite communications which provides a link-up with Western European and American commercial and military communications systems.

The Arab countries, including those on the Arabian Peninsula, are continuing work to improve the Arab system of satellite communications. The Arab Satellite Communications Organization, ARABSAT, an organ of the League of Arab States, was created in 1977, with headquarters in Riyadh. It includes 22 countries, and its primary purposes are rendering technical and financial aid to Arab states in the construction of satellite communications ground stations, conducting space research, applying satellite communications to various branches of industry, and creating a united system of television, telephone, and telex communications. It maintains close contacts with the international space communications organization, INTELSAT. In April, 1984, in Amman (Jordan) a regular session of ARABSAT was convened, whose work included discussing measures to complete preparations to launch the first Arab satellite. An agreement was concluded with the United States to supply computers that would provide a link-up with American and Western European communications systems.

The French firm of Aerospaciale, the American Ford Aerospace and Communications, and the Japanese Nippon Electric Company took part in realizing ARABSAT's program. French specialists are building three satellites and the Japanese are outfitting the ground control stations and are training the technical personnel of the Arab nations to service the equipment.

In February, 1985, the European rocket carrier ARIAN put the first satellite into orbit. The second satellite was launched in June of the same year using

an American-piloted, multipurpose, space shuttle. The third satellite will be kept on earth in reserve. It is intended to be launched in the event one of the satellites in stationary orbit is disabled. In order to control and track the operation and flight of the satellites, which are calculated to operate seven years, 20 ground stations have already been deployed. The main one is located in Riyadh with auxiliary ones in Kuwait, Oman and other Arab countries.

Each satellite permits the operation of one television and 8,000 telephone channels, of which 26.6 per cent is allocated to Saudi Arabia.

The ground stations are intended to receive and transmit television programs, telephone and telex communications. They have antennae with diameters of 11 and 3 meters. At the same time, cable and radio relay communications lines are being laid down.

All of these measures to develop the multipurpose communications systems in the nations of the Arabian Peninsula make it possible, in foreign specialists' opinion, to increase, to a significant degree, the reliability and efficiency of the whole system of communications in a region in which today the nations of the West are directly interested and where they are trying to strengthen the dependence of these nations on the aggressive NATO bloc.

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FOREIGN MILITARY REVIEW

MOVEMENT TO CONTACT OF AMERICAN ARMORED DIVISION

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 12, Dec 85 (Signed to press 11 Dec 85) pp 33-40

[Article by Col A. Yegorov, Candidate of Military Sciences, Docent; "Movement to Contact of an American Armored Division"]

[Text] American imperialism, following great power hegemonistic goals, unceremoniously interferes in the internal affairs of other states and nations, stirs up various international conflicts, and threatens to unleash a new, unprecedented in scale, world war and thereby pushes mankind to the brink of catastrophe. In the U.S. political-military leadership's aggressive plans, importance is placed on raising the ground forces' combat capabilities by equipping them with modern weapons and combat equipment, improving organizational structures of formations, and discovering more effective means of using them in combat.

In foreign specialists' opinion, the outstanding characteristics of modern combat are high dynamism and mobility, lack of coherent fronts and defined flanks, exceptionally great span of territory and substantial spread of forces on front and in depth, intensive and simultaneous combat activity throughout the total depth of combat formations, broad employment of highly effective systems of military weapons and combat equipment, reconnaissance resources, target acquisition, and command and control. In this connection, army leaders are trying to increase mobility of the ground forces, to train them to perfect marches in complex situations and the skillful conduct of maneuver on the battlefield. Therefore, formations' march training and their skill in conducting meeting engagements has recently received great attention during combat training and various exercises. It is believed that equipping tank troops with new types of combat equipment and improving their organizational structure will contribute to increasing their potential to successfully complete a march over a considerable distance under direct enemy operations, vertical envelopment, and diversionary-reconnaissance groups.

According to foreign military press evidence, the future armored division (Division 86) will include the headquarters and headquarters company, three brigade headquarters, six tank and four motorized infantry battalions, division artillery (a battalion of 203.2-mm self-propelled howitzers and PC30 MLRS, three battalions of 155-mm self-propelled howitzers), an air defense

battalion (three batteries of VULCAN guns and STINGER missiles, and one of CHAPARREL missiles and STINGERS), a brigade of army aviation (four battalions--two anti-tank helicopters, one general support helicopter battalion and one reconnaissance), three separate battalions (EW, signal and engineer), division rear (six battalions--maintenance, transport and supply, medical and three brigade support, MTO center), a chemical defense company and military police company. Plans are to have about 20,000 personel altogether, 348 M1 ABRAMS tanks, 216 BRADLEY IFV with TOW ATGM, 118 M3 CFV with TOW ATGM, 465 M113A1 and M577A1 APC, 12 203-mm M110A2 self-propelled howitzers and 72 M109A3 self-propelled 155-mm howitzers, 9 PC30 MLRS, 66 81-mm mortars, 48 M901 self-propelled ATGM, 252 DRAGON ATGM, 18 CHAPARREL surface-to-air missiles, 36 VULCAN air defense guns, 75 man portable STINGER air defense missiles, 146 helicopters (50 of which are equipped with HELLFIRE ATGM.)

Marches by formations and units, as noted in the foreign press, are components of all combat operations. The principal goal is the timely arrival of forces at the designated area (at a control feature), maintaining thereby the combat capabilities and potential to enter battle with the enemy.

Marches are divided into two categories in the U.S. Army, depending on movement conditions, the situation, transport and march methods selected: administrative and tactical.

Administrative marches are employed in those situations where contact with enemy ground forces during the march is unlikely or altogether impossible. During these, the main concern is preservation of personnel strength and economy of materiel. Small unit administrative marches having a single speed of march are, as a rule, conducted in a single column. Columns moving at different speeds are normally assigned different routes.

Tactical marches are normally conducted when meeting the enemy is foreseen, either during the march itself or upon arrival of the unit at a designated area. In this connection, one of the most important requirements for the troops is their constant readiness for an organized transition to battle and successful accomplishment of their assigned mission. Therefore, organization of a tactical march should create orders of march which will ensure rapid deployment into combat formations for meeting engagements.

As emphasized in American manuals, successful mission accomplishment on the march will largely depend on the conditions under which it is conducted. It is suggested that in the modern context the principal means of attacking troops on the march is enemy air. In consideration of this, it is recommended that divisions conduct marches on a broad front in a dispersed march formation, most often at night or under conditions of reduced visibility.

Judging by many publications, the tank division can make a march as a part of a corps main body or independently (when located in reserve or operating separately). For a division march, a zone is designated with a width of 20-30 km in which two to four routes are indicated. They are selected so as to be separated from each other by 4-5 km to prevent the two moving columns from being affected by a single medium-yield nuclear weapon. Also, in designating

the division zone, supplementary routes are indicated in case the main route is rendered useless (Fig. 1).

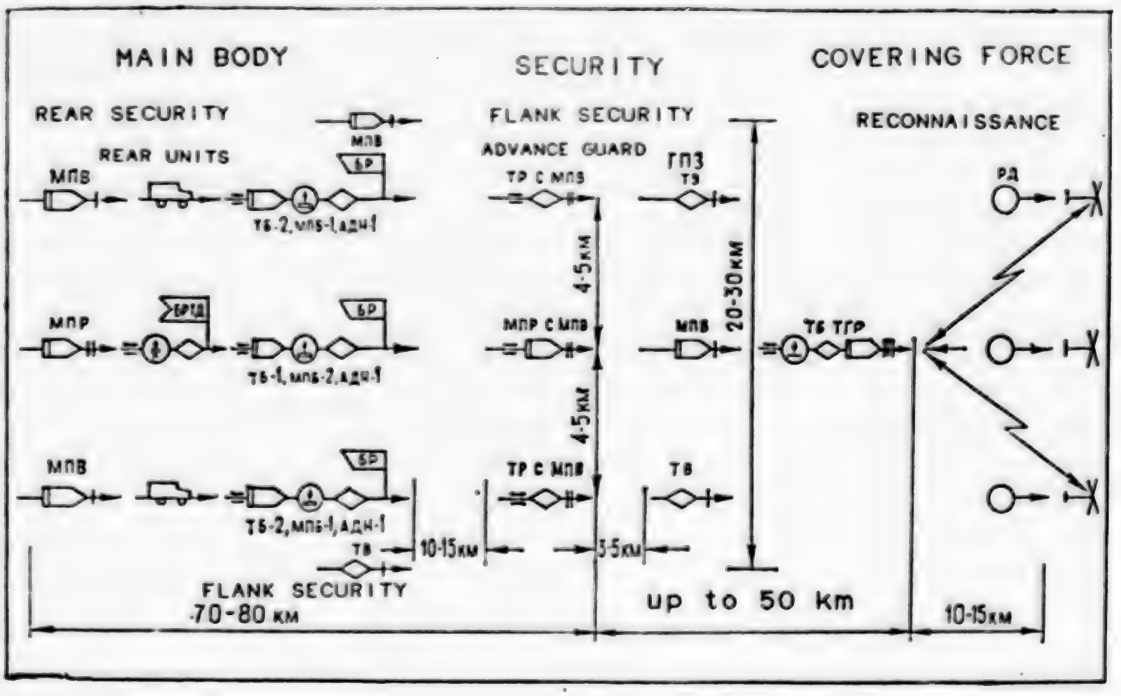

Figure 1. Construction of a U.S. Armored Division Order of March (Variant)

МПВ - Mechanized Infantry Platoon
МПР - Mechanized Infantry Company
МПБ - Mechanized Infantry Battalion
АДН - Artillery Battalion
БРТД - Division CP
ГПЗ - Advance Detachment
РД - Reconnaissance Patrol
ТВ - Tank Platoon
ТБ - Tank Battalion
ТБ ТГР - Tank Battalion Task Force
БР - Brigade
МПР С МПВ - Mechanized Infantry Company with a Mechanized Infantry Platoon
ТР С МПВ - Tank Company with a Mechanized Infantry Platoon

Foreign military specialists recommend structuring the division march order according to the situation, mission, commander's concept, time available, terrain, level of training, and condition of the road networks, with the goal of ensuring the possiblity of deploying for battle from the move. As a rule, the division moves in approach columns, each of which contains units and subunits of the various branches, following one another along the same route. An approach column may contain one or more echelons, which constitute march groups moving at the same rate. The march group usually includes subunits up to and including companies or batteries. Approach columns of the division, depending on the situation, may be open in conditions where enemy fire is anticipated) and closed (for night movement and along a well developed road network), that is, the separation between vehicles should be respectively 100 m and more and not exceeding 50 m.

The elements of a tank division formation on a march anticipating a meeting engagement are the covering force, security, and main body. These elements, in the view of the army leadership, can ensure the uninterrupted movement of the division at the intended rate of march, the reliable security of its advancing columns and the ability to quickly deploy for battle.

As foreign experts note, during the preparation and conduct of such a march, much attention is devoted to organization and conduct of reconnaissance throughout the entire movement corridor of the division and on its flanks. Special significance is attached to aggressive operation of reconnaissance organizations during the period of closure with the enemy, to ensure timely arrival of essential information for the division commander on the composition, firepower, and possible nature of his activities. To accomplish this, patrols are formed by the division cavalry squadron which can scout to distances of 50 km and more from the main body. Also, on routes of anticipated enemy advance and in areas of possible enemy concentration they expect to employ reconnaissance--diversionary groups. Scout helicopters are used to conduct reconnaissance forward (up to 150 km) and on the flanks, and radio reconnaissance is used to intercept enemy radio transmission at long distances.

Covering forces, separated from the main body by distances of up to 50 km, operate throughout the division sector mainly to ensure the secure movement of the main body and its timely deployment for battle. Additionally, they have the following missions: reconnaissance of localities and an approaching enemy, seizing and securing tactically important objectives (terrain features) until the main body approaches or holding its force on one of the approaches. Composition of the covering force depends on the division's specific mission, the developed situation, and march conditions. It may be given a tank (or motorized infantry) battalion task force or a reinforced cavalry squadron with air defense and artillery. Covering force operations should be supported by tactical and army air. Control of the covering force should be accomplished in a centralized manner by the division commander unless the advance is on a broad front, in which case it may be decentralized.

Security on the march includes advance security, flank security, and rear security (AS, FS, RS). It is intended to prevent a surprise attack on the main body, warn them of the appearance and nature of enemy activities, ensure the uninterrupted movement of the column, and create favorable conditions for the division main body's deployment and entry into the battle.

Advance security (advance guard) is separated from each advancing column of the division main body, in other words from each brigade, on the same route. Its composition, as foreign military specialists contend, is based on the terrain, assigned mission, march conditions, an expectation of the enemy. Usually it is a company team or battalion task force (tank or motorized infantry) with artillery, engineers and other combat support subunits. It may be separated from the main body by 10-15 km. In its turn, the advance security party (AP, up to a reinforced platoon) is sent, as a rule a distance of 3-5 km, and the reconnaissance patrol, with a tank section, is another 1-3 km from it. It has the mission of providing the commander timely warning of the enemy, barriers, and other obstacles on the route.

Security for the flanks and rear of the division main body are conducted by the flank and rear security (flank and rear detachments). Their composition, depending on the nature and conditions of the march, may be a reinforced platoon or company (sometimes a battalion task force). Flank security normally follows a route parallel to the main body's, even with its leading

columns or proceeds in stages, occupying critical terrain features along the route. Rear security follows the main body to warn the commander of the advancing columns of a possible attack by the enemy from the rear.

The main body contains the principal firepower of the division and must always be ready, as American military specialists assert, to deploy for battle with an approaching enemy, force him to deploy, strike an unprotected flank or rear of the main body, seize the initiative and, using all of his available firepower, destroy him.

As noted in the foreign press, the organization of the main body, which depends on the mission, and the division commander's decision concerning the anticipated meeting engagement, should ensure the possibility of rapid deployment of the units and subunits. Usually these are formed into several march columns, each of which should be capable of independent combat when necessary. With this in mind, special attention is given to correct order of forces on the march when a meeting engagement is foreseen and to optional placement of division assets.

It is noted in the American press that artillery is included in the covering and security forces, as well as being placed in the march columns in sufficient strength to be able to deploy quickly, occupy advantageous positions and use its firepower to assist an organized deployment for battle and successful operations of the units and subunits. The recommended artillery assignments are for 155-mm self-propelled howitzer battalions to be with brigades, and organic and mixed artillery battalions remain under the control of the division commander. They travel with main body of the division and carry out general support of brigades with the commencement of the meeting engagement.

Air defense planning is based on the division commander's decision and in which the assignment of organic and attached air defense assets in the march columns, their missions and order in the march are designated. The foreign press notes that the division may have attached a battalion of Improved HAWK (three batteries of nine missiles) from the corps air defense brigade, which will move by battery and provide cover from neighboring high ground for the units and subunits from enemy air strikes. The organic air defense battalion is employed principally for engagements of low-flying aircraft. It moves by battery within the march echelons. Mixed firing batteries may be formed from the organic air defense to improve their effectiveness.

While planning the march, great attention is devoted to engaging enemy tanks. Anti-tank organizations, including TOW ATGMs follow the head of the columns of their motorized rifle battalions as closely as possible in order to be capable of timely deployment and sudden attacks against attacking tanks, IFVs and APCs.

Small engineer subunits are normally included in the composition of the main body and the covering forces and security, as well. Their mission is to reconnoiter the route, destroy obstacles along the movement axes, search out bypass routes and occupy them, eliminate nuclear contamination, occupy

crossings over water obstacles, and protect the movement to contact of divisional units.

Radio silence is maintained while on the march (transmissions are absolutely forbidden until enemy contact is made). Therefore, communications are normally supported by mobile assets and fixed teletypes of territorial signal units. Upon initiation of a meeting engagement, communications organizations quickly deploy and provide command and control.

Division support units and subunits, as shown in American manuals, should follow in a separate column behind the main body on one (sometimes two) of the routes.

In military specialists' estimate, the length of a division march formation depends on the composition of the division, movement speed, and the interval between vehicles, units and subunits. The average movement speed of an armored division on a well developed road network can be as much as 25 km/hr in daylight and 15 km/hr at night. Off-road movement is at about half of those speeds. Intervals on the march depend on the speed of movement, march conditions and can be 25-100 m between vehicles, 500 m (2-3 min) between companies (batteries), 3-5 km between battalion columns (5-7 min), and 5-8 km (10-15 min) between brigades. Using the median movement speed and interval, the length of the march formation for a battalion would be 5-7 km, a brigade 25-30 km, a division 70-80 km (three routes) and 110-120 km (two routes).

The daily march distance of an armored division, as shown in foreign sources, may reach 200 km and more. Every hour and 45 minutes there is a 15-minute halt for vehicle checks and repairs and personnel rest and, after 7-8 hours, rests of up to 2 hours are taken. However, depending on the developed situation, the latter may be skipped and the number of stops reduced to a minimum.

As noted in manuals, armored division marches usually end with the arrival of the main body in the objective area or in a meeting engagement.

MEETING ENGAGEMENTS, in the view of American military specialists, occur when the force completes its movement to contact (the course of closure with the enemy), upon maneuver to repel a counter attack of enemy reserves during an offensive, or upon conduct of a counter attack (counter strike) against the enemy forces which are penetrating the defense and developing the offensive. It is believed that in modern warfare, especially in the early stages of a battle, meeting engagements will occur frequently. They are characterized by highly mobile forces, short-duration combat actions, high maneuverability, rapid changes in the situation, lack of good information on the enemy and insufficient time for organizing the battle. Also, according to the U.S. concept of "Airland Battle," defeat of the enemy should take place simultaneously throughout the entire depth of this formations. Therefore, employment of firepower will be closely coordinated and combined by a concept which is unified with the combat actions of the divisions and brigades, as well as with tactical aviation.

As foreign military specialists suggest, to achieve success in a meeting engagement, it is necessary to set up an optimal order of march, prevent the enemy from deploying and preparing for battle by rapidly attacking him from the move, make broad and rapid maneuvers, seize key terrain quickly, seize the initiative and inflict your will upon the enemy. It is stated that commanders at all levels should be skilled at rapidly estimating the situation, quickly reaching a decision and giving instructions to subordinates, introducing units and subunits into battle from the move, and deploying them from the march column. In this, they must be guided strictly by four basic principles of conducting the Airland Battle, the essence of which is initiative, depth, speed and coordinated action.

The army leadership believes that armored divisions, which, having the necessary armored protection, mobility, and firepower, can quickly, at the crucial moment and place, establish dominance over the enemy, and most fully satisfy the requirements for conducting meeting engagements.

The foreign press notes that cavalry units are the first to directly encounter the enemy in a meeting engagement. They inform the division commander of the composition of the enemy force, the probable course of his actions, etc. Security forces initiate battle using their leading units and subunits (based on their proximity to the enemy)(see Fig. 2), which are operating, as a rule,

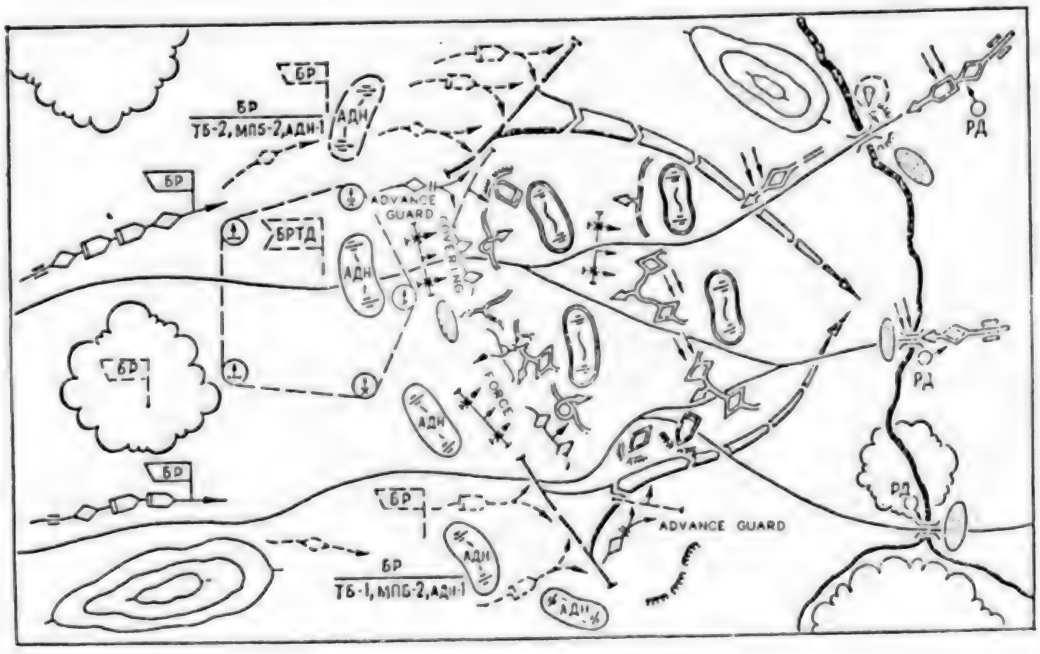

Figure 2. U.S. Armored Division in a Meeting Engagement (Variant)

БР - Brigade
БРТД - Division CP
РД - Reconnaissance Patrol
АДН - Artillery Battalion

on a broad front under cover of field artillery, anti-tank helicopters, and other anti-tank means, and strike the enemy with the goal of achieving maximum destruction and preventing organized deployment on favorable terrain.

The covering force battle is, in turn, supported by the approaching advance guard, which deploys to attack the enemy according to the order of the subunits in the approach column. Its combat formation is usually built around one echelon for inflicting the maximum possible damage on the enemy or siezing key terrain (boundaries) so that, in coordination with the covering force, they can provide the best possible conditions for the deployment of the division main body. The covering force and advance guard battle is supported by tactical air and army aviation, field artillery and other means. If they encounter a superior enemy force or unfavorable conditions, the covering force and advance guard may hold the enemy force or temporarily go on the defensive on favorable terrain in order to create favorable conditions for the planned deployemnt of the armored division main body and its entry into the battle.

The division commander directly controls the forces engaged in battle. The division and brigade CPs evaluate the situation and information on the enemy during the course of the battle to determine the boundaries between units, open flanks, concentrations of main forces, etc. Based on his estimate of the situation and the enemy force and intentions, the division commander decides on the introduction of the main body into battle, determines the attack formation, establishes zones of action for the units, order of mutual support upon accomplishment of missions, and defines the nature of following activities.

As American military specialists note, depending on the developing situation, the main force may be introduced into the battle simultaneously, that is,

after a short halt and preparation of their deployment or directly from the march (by units) in order of march.

Introducing the main body into battle simultaneously would take place upon meeting a superior enemy force. Approaching units concentrate at designated points, quickly prepare for battle and go on the offensive, which may start, according to the military press, within 2-3 hours of the initial advance guard battle. In this case, the division should be organized in two echelons: the first normally contains two brigades, one in the second. When each brigade is on one route, deployment for the meeting engagement takes place respectively in battalions, companies and platoons at distances of 10-12, 6-8, and 2-3 kilometers from the enemy. A brigade in the main attack would have not fewer than three tank and two motorized infantry battalion tank forces, reinforcing artillery and engineers. The main attack should take place on a flank or rear of the moving enemy before his deployment for combat. A single echelon formation is used when the division is deployed on broad front.

Deployment of the main body directly from the march is recommended when there is a distinct superiority over the enemy as a result of suppressive fires or when rapid action is necessary to prevent the enemy from stabilizing the situation and concentrating his forces in the battle area. In these cases it

is believed that a division offensive is possible 40-60 minutes after the advance guard battle begins.

American military specialists suggest that the principal form of maneuver for a meeting engagement is the envelopment (and its variation--envelopment and encirclement with the goal of striking the enemy flank or rear. In other circumstances when the enemy is warned and deployed on good terrain, other forms of maneuver such as the penetration or frontal attack may be employed. Selection is determined by peculiarities of the battle area and the enemy force and activities.

The width of the offensive in a meeting engagement, according to American manuals, depends on the mission, force composition, reinforcements, terrain, the opposing enemy's composition and situation, and may be: 20-30 km for a division, 8-12 km for a brigade, up to 5 km for a battalion task force. Depth and mission content as well as the rate of the offensive are determined by the actual combat situation.

Judging by reports in the foreign press, the attack of the main body is preceeded by deep fires (nuclear) against the enemy, including powerful fires along the enemy FEBA and on his reserves. Artillery occupies firing positions when the lead subunits approach contact with the enemy and quickly open fire, protecting the deployment and attacks of tank battalions. Tactical aviation acting in support of the division, from the start of battle, not only delivers strikes on the enemy force, but also isolates the battle area and prevents the approach of the enemy reserve. A great deal of attention is devoted to employment of anti-tank helicopters, whose mission is primarily the destruction of tanks and combat vehicles in the area of the division's main attack, and the use of EW.

As the American military press reports, in accordance with the principal provisions of the new concept, the division commander, leading the conduct of the meeting engagement with an enemy which is in direct contact, simultaneously organizes his forces and accomplishes destruction, disorganization and the delay of the units and subunits of the second echelon (reserve) of the opposing enemy force. To accomplish this in the division combat zone (to a depth of 15-70 km) tactical aviation, fire support helicopters, tube artillery, and MLRS may be employed. Brigade commanders must organize and carry out attacks against second echelon subunits and enemy first echelon units.

During a meeting engagement, vertical envelopments (by up to a motorized infantry battalion) may take place to a depth of 15-20 km from the FEBA to capture key terrain, assist the maneuver, and prevent the advance of the enemy reserves, and support the covering force and advanced guard. Great significance is attached to laying minefields on enemy avenues of approach to contain maneuver and limit freedom of movement, for which remote mine emplacement is employed.

Army leadership believes that, with the introduction of the main body of an armored division, the meeting engagement is ended and the force transitions to

the offense or, depending on the actual situation, changes to other activities.

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LASER SIMULATORS FOR WEAPONS FIRE TRAINING

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 12, Dec 85 (Signed to press 11 Dec 85) pp 43-48

[Article by Maj A. Paisov, Capt A. Tsarev;" Laser Simulators for Weapons Fire Training"]

[Text] In the militaristic preparations of the leading circles of the aggressive NATO bloc, which is trying to achieve military superiority over the Warsaw Treaty member nations, an important place is being accorded to improving combat training in all branches of the armed forces. At the same time, special attention is being paid to improving ground forces personnel field training and firing instruction. The foreign press notes that outlays for conducting combat training are increasing from year to year. This is in part conditioned by the rather high cost of guided missiles (according to reports from the American journal NATIONAL DEFENSE, the cost for a portable STINGER anti-aircraft guided missile has reached $80,000) and constantly rising costs for ammunition. Thus, over the last ten years, the index for a standard round for an American 105-mm tank gun has increased almost six fold.

These and other reasons associated with problems in rationally using firing ranges and training centers, as well as with realistically evaluating the effectiveness of new models of armaments, has necessitated the search abroad for new ways to train in weapons firing that are capable of replacing traditional individual fire training and simultaneously substantively improving its quality.

Ground force commands in a number of NATO countries envision creating and widely introducing into the forces laser systems which simulate fire as one way of solving the problem. Such devices, the Western press notes, are already being used for fire training on various kinds of arms in the armies of the U.S., Great Britain, France, FRG, and other countries. In foreign specialists' opinion, the use of laser fire simulators (LFS) make it possible to conduct instruction and training among subunit personnel (up to and including the battalion) on standard combat equipment day and night under conditions that most closely approximate those in combat.

The relative simplicity of the design, the rather high reliability, and quick action make it possible to mount such systems on various models of arms and,

by using them, simulate firing from rifle, artillery and guided missile weapons. The basic design elements of laser fire simulators are the transmitter, which uses lasers based on semiconductors with a long emission wave of 0.9 micrometer laser emission receptors (photodiodes), control panels, a means to indicate damage, and a power supply. The transmitter is mounted on the weapon in such a way that the axis of the laser beam is parallel to the aim line.

The small angle of divergence of a laser beam and the capability of comparatively easily changing its size in the transmitter provides the maximum approximation of the beam characteristics to the corresponding indices for munition dispersion when firing at various ranges. The beams activate the receptors which register whether the target has been hit. The average density of the energy from a lazer emission on the target does not exceed the threshhold value of safety to the eyes (1.8 x 10-6 joules/cm2). In order to fire on moving targets with an allowance for the laser simulator, special devices are used which take the munition's time of flight under consideration.

In Western specialists' opinion, the American all-purpose laser fire and destroy simulation system developed by Xerox Electro-optical Systems, at the present time stands out as the optimal system, based on the criteria of cost-effectiveness and relatively simple design. It was put into service in the U.S. ground forces in 1979. Delivery of the system to the troops commenced in the mid-1980s. As witnessed in the foreign press, the MILES simulator is used in the armies of many capitalist countries. It is noted that the use of this system in the two-sided battalion tactical exercises in the national training center at Fort Irwin (California) has made it possible to cut down significantly on the number of umpires and radio communications assets enlisted for the exercises.

The laser transmitter of the MILES simulator comes in several modifications allowing one to use the system to simulate the fire of various weapons: the M16A1 rifle, the standard M60 machine gun, the 105 mm tank gun, etc. It uses a semiconductor laser based on gallium arsenide (GaAs) that works in an impulse state. The divergence of the laser beam is 5 mrads.

When mounting the MILES simulator on a rifle, the laser emission transmitter is affixed in front of the muzzle end of the barrel. Eight photoreceptors go on the shoulder straps of the equipment kit of each serviceman and five on his helmet. The transmitter is turned on by firing a blank cartridge. The transmitter creates a laser emission, the cross section of which can be perceived as two concentric diameters with varying energy characteristics. The inner layer of the impulse transmits coded information on "damage" to the target, and the outer layer--on a close "miss." If at least three photoreceptors receive a hit signal, the target is considered "wounded." In this case a buzzer, mounted on the right shoulder, emits a constant sound signal. A broken signal means a "miss." To turn off the constant signal and simultaneously block the laser transmitter from the signal, a special key is removed and inserted into a corresponding hole on the soldier's equipment. The nickel cadmium battery and a decoding device fit into two small cases mounted in back on the helmet and the solder's equipment kit.

An analogous principle for simulating rifle fire is used in the English SAVES simulator, built by the firm of Centronic Optical Systems. This set of equipment in particular can be used to conduct bilateral exercises. The laser transmitter, based on gallium arsenide (with a strength of 75 watts), is mounted in a single assembly on the front sight of the rifle. It is fed by a standard 9-volt battery. The maxiumum range of the transmitter is 2,000 meters. The photoreceptors are evenly distributed on the special equipment kit and the helmet of the participants in the exercise. The laser emission transmitter is turned on when a blank cartridge is fired as well as by of a special device on the ejection clip. One feature of the SAVES fire simulator is the presence of a microprocessing device which allows one to determine the degree of damage to the target. An indication of "lethal damage" is made known through a constant sound signal, while a "wounding" is indicated through a second-long short signal. Based upon reports from the foreign press, the cost of one SAVES set is about 200 pounds sterling.

The English firm of Weston Schlumberger developed the SIMGUN laser simulator for rifles, which, in Western specialists' opinion, can be used to perform tactical missions in practice firing and training in rifle and machine gun fire. The device contains a laser transmitter (weight 0.4 kg. mounted on the muzzle end of the rifle or machine gun, 15 photoreceptors (total weight 0.2 kg) are distributed on a special piece of equipment and the helmet of the exercise participants, as well as a control panel. The battery unit is able to produce no less than 10,000 "rounds" and can work uninterrupted over a 48-hour period. "Injury" to a soldier is designated by a constant sound signal which stops after the soldier lies down on his back. He will lie in that position (imitating a casualty) until an umpire puts him "back into service."

Western specialists consider the use of laser fire simulators to be quite useful as well in instructing tank crews in firing. A tank, equipped with this system, can act both in the role of attacker as well as defender. The American MILES tank laser simulator set consists of laser transmitters mounted on the gun and the anti-aircraft machine gun, photoreceptors (21 units) placed along the perimeter of the tank's turret, a control panel, and a set of acoustic and pyrotechnical damage indicators. Data are entered ahead of time into the logic circuit mechanism of the device concerning the target " damage" probability of one kind of weapon or another. The circuit can be linked by radio to a central computer which compiles statistical data characterizing the exercise operations. Damage to the target is simulated by a light signal and the explosion of a pyrotechnical cartridge.

The signal of the laser transmitter consists of several impulses which are broken down into time intervals of specific duration. The code which is used is selected to correspond to the simulated type of weapon. In this way, one can eliminate the possibility of destroying a tank with an M16 rifle. The use of a mult-impulse signal also reduced the probability of accidently activating a photoreceptor, for example, as a result of exposure to a sun ray.

The Bundeswehr has had the TELISSI tank laser fire siumlator, developed by the West German firm of Kurt Eichweber Prazisionsgeratewerk, in service since 1979. The simulator's equipment set basically is the same as the American MILES tank fire simulator device. One design feature of the TELISSI is the

mounting of the laser emission transmitter inside the barrel of the tank gun. The tank gunner, having detected the target, determines its range using an optical range finder, selects the appropriate type of ammunition and enters the necessary data to fire into the simulator's control unit.

When "fired," the laser transmitter emits a coded series of impulses which then reflect off the optical receptors (angular prisms) located on the target tank's turret. In this way, one can determine the true range to the target (with a precision of +/- 5 meters), which is then compared to the range previously measured optically. If the resulting difference in measurements does not exceed the tolerated aiming error, the laser transmitter emits a second series of impulses with information on "damage" to the target which block the fire simulator device on the targetted tank. The indication of "damage" is made with a pyrotechnical cartridge and the emission of a light signal. When there is an aiming error at the target which exceeds the tolerated level, information on the "miss" is transmitted using laser impulses, and, on the illuminated display board of the firing tank's control unit data is generated as to whether the fire was too short or too long and how much ammunition is left.

Judging from reports in the foreign press, the firm of Kurt Eichweber Prazisionsgeratewerk has completed development and is currently mass producing an improved modification to its laser fire simulator, which it has named the TELISSI-5. This simulator is intended to be mounted on tanks equipped with a fire guidance system and laser range finders. It differs from earlier modifications in its ability to simulate fire from tank guns at targets which move at speeds of up to 50 km per hour and at ranges of up to 3,750 meters. The system provides simulation for 100,000 "rounds" from the tank gun, using 10 types of projectiles with a minimal interval of 6 seconds.

The British firm of Weston Schlumbarger has developed a modified version of its SIMFIRE simulator, which is widely used in the armies of capitalist countries. It has been given the name SIMFIX and is intended to be used to train combat vehicle crews how to shoot from vehicles equipped with ballistic calculators and laser range finders. About 300 sets of these simulators have been ordered for the British ground forces, where they will be used on the new CHALLENGER tanks. The system makes it possible to simulate the firing of a tank gun using three different types of munitions, both in place and on the move, at non-moving and moving targets, by day and by night.

The laser simulator contains a transmitter mounted in the barrel of the gun and consists of two laser radiating elements, a control unit and power pack, no less than five photoreceptors distributed along the perimeter of the turret, a radio station, as well as sound, light, and smoke "damage" indicators. "Firing" results are displayed in the eyepieces of the commander's and gunner's sights of the tank doing the firing. In order to "fire" on moving targets, the control unit of the simulator has an automatic lead device built into it.

Having once detected the target, the tank commander issues a command to commence firing. Using a laser range finder, the distance to the target is determined, and this value is placed on the control unit panel. The gunner

selects the appropriate type of ammunition, presses the knob to load the tank gun, and within one to two seconds a signal appears on the illuminated display of the control unit on the readiness to open fire. Then the gunner adjusts the point of aim and "fires." The laser transmitter mounted in the gun barrel emits a series of impulses. In so doing, it simulates the muzzle flash. Photoreceptors mounted on the target tank fix the laser emissions and an indicator on the control unit warns the crew of the "shelling." Damage to the target is simulated by means of an explosion of a pyrotechnical cartridge that gives off an orange smoke and is mounted on the tank's turret. Also, a signal lamp lights up and the engine and gun are simultaneously stopped.

As noted in the foreign press, at the present time, a number of leading capitalist countries have created and are using laser simulators to train operators of anti-tank and air defense missile systems, as well as the crews of anti-aircraft guns. In the FRG, an appropriate modification to the TELISSI is used to teach and train MILAN anti-tank guided missile operators. The equipment set contains a laser emitting transmitter and an operator's panel mounted in a single unit in front of the aiming device, plus 12 photo receptors, a tracking device, and a response lag (error) indicator. The control unit provides the formation of a series of laser impulses and an analysis of the emissions used. It is noted that the impulses' parameters take consideration of the ballistic characteristics of the missile, the rate of fire, and other necessary data. The foreign press reports that the TELISSI simulator permits one to "launch" missiles at both non-mobile as well as mobile targets.

When the American MILES simulator is used with the DRAKON and TOW anti-tank missile systems, the laser transmitter replaces the equipment's tracking system. In the process of simulating and guiding the ATGM, the operator should track the target, intercepting it with the sight line of the sight (particularly during the last 2 seconds of the cycle which spans a 10-second period and corresponds to firing the missile at a target at a range of 2,000 meters).

In order to cut down on expenditures to train operators on portable STINGER anti-aircraft missile systems, the American firm Brunswick is currently creating an appropriate laser fire simulator. An analogous system is also being developed in Great Britain.

To simulate combat between ground and aerial weapons, and primarily between tanks and helicopters, laser simulators also can be installed on the latter. British army aviation has already mounted the SIMSTRIKE simulator on LYNX helicopters to simulate firing on tanks with TOW missiles. In the Bundeswehr, BO-105P fire support helicopters can be equipped with a corresponding variant of the TELISSI simulator to simulate the launching of HOT anti-tank guided missiles.

Active work on creating laser fire simulators for various weapon systems is also being carried out in Italy, France, and Sweden. The most success in this area, as noted in the Western press, has been achieved in Great Britain. For example, it is reported that, over the last 15 years, the English firm of Weston Schlumberger has produced about 5,000 SIMFIRE sets for mounting on

tanks, rifles, anti-tank rocket launchers, anti-tank missile systems, and combat helicopters. They are used in the armies of more than 30 capitalist countries. American specialists believe that laser simulators can be used not only to teach certain skills in combat training, but also to obtain preliminary data in the course of bilateral tactical exercises to develop mathematical models for combat operations, to compare weapon systems, and to develop new tactical movements in conducting a battle.

9355
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U.S. NBC DEFENSE COMPANIES DESCRIBED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 12, Dec 85 (Signed to press 11 Dec 85) pp 48-49

[Article by N. Leonidov: "American NBC Defense Companies"]

[Text] Despite the Soviet Union's peaceloving proposal to prohibit the production and use of weapons of mass destruction (Oruzhiya Massovogo Porazheniya--OMP), the principal capitalist countries, especially the U.S., continue to spend enormous resources for the development of new types of such weapons. Much attention is being paid to the training of troops to conduct combat operations when OMP are used and the organization of their defense. Thus, in the U.S. armed forces there are more than 4,700 trained specialists, formations and subunits for the defense against OMP, which can be included in the make up of detached brigades, armored regiments, divisions, and army corps. In this case, they are organic and, as a rule, organizationally included in the subunits responsible for rear support.

The indicated subunits execute the following primary missions: analyze the targets for which the enemy can employ OMP; warn own forces concerning strikes using these weapons; process reports on the use of OMP by the enemy; analyze own forces' degree of vulnerability to OMP.

The defense company is the primary subunit for defense against OMP in U.S. Army divisions. Its mission is to detect contaminated terrain areas and to conduct decontamination of personnel and combat equipment. Organizationally, a company is made up of a headquarters and three platoons (a total of 111 personnel). It is equipped with 28 vehicles of various types and 18 radio sets.

An NBC defense company has three decontamination and one reconnaissance sections. It can be placed under a brigade command and execute the same missions as the above- mentioned company. The decontamination section consists of eight men (commander, sergeant and six privates) and is equipped with decontamination equipment. There are ten men in the reconnaissance section (commander, two sergeants, and six privates). It has in its equipment, three quarter-ton vehicles with special instrumentation. As a rule, it operates in three-man groups.

In order to accelerate the decontamination of main armament and decontaminate personnel in the American "Division-86," it is planned to supplement the NBC defense company with two platoons. The company's capabilities to conduct terrain reconnaissance and decontamination are limited. Therefore, in the division's (corps) subunits, it is used as follows: primarily in combat battalions and secondarily in supporting subunits located initially at the FEBA and then in the rear.

In an offensive, the company headquarters is located in the direct proximity of the main division (corps) command post. On the defense, the NBC defense company's reconnaissance sections conduct a search and define terrain areas suitable for conducting decontamination of personnel and also partial processing of weapons and military equipment.

For conducting field decontamination of subunits subjected to contamination, by toxics or radioactive substances, decontamination points are developed and each of them is serviced by one decontamination section.

In accordance with requirements being imposed on the indicated [decontamination] points in the U.S. Armed forces, the terrain areas on which a point will be deployed must be uncontaminated, located close to water sources and be laid out, depending on its capabilities, in a wooded terrain or in an area of large buildings where it is possible to provide it with cover and camouflage.

To improve the point's traffic capacity, personnel who have been contaminated and have gone through decontamination assist the NBC defense subunits: they help set up the point, move personal equipment to an assembly area for decontaminated personnel, control subunits' ingress and egress from the point, support the NBC defense subunits, conduct decontamination, and with material resources.

At each point a specified order for carrying out complete decontamination is established. The length of time to process military equipment subjected to toxic substance contamination is 78 minutes (by stages: 1, 5, 15, 30, 2, 15, and 10 minutes). However, using a flowline method, the first vehicle finishes after 78 minutes and each successive one at 15 minute intervals. Thirty minutes are spent decontaminating the first two individuals and they follow at 5 minute intervals. A point's throughput capacity is limited to a certain degree by the physical condition of the decontamination section's personnel (they tire quickly because they are dressed in protective clothing and gas masks and they require additional time for rest).

The American command attaches great significance to the NBC defense subunits for the retention of forces' combat effectiveness when weapons of mass destruction are employed.

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TACTICAL AVIATION AIR NAVIGATIONAL SYSTEMS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 12, Dec 85 (Signed to press 11 Dec 85) pp 58-65

[Article by Col B. Yarunin, Candidate of Technical Sciences; "Tactical Aviation Air Navigational Systems," passages rendered in all capital letters printed in boldface in source]

[Text] According to foreign press reports, the modern aircraft of NATO's tactical air forces possess a sufficiently high degree of automation for executing primary missions, including navigation. However, in order to achieve a significant increase in existing and future aircraft combat operations effectiveness, and to achieve superiority over socialist countries' air forces, the governments--members of the aggressive imperialist NATO bloc constantly continue to search for and work on perfecting onboard sighting and navigation systems and their components. They spare no resources in doing this, sometimes diverting them from the appropriations for social and economic needs.

New and modern aircraft are distinquished from their predecessors not only by their flight characteristics, but also by their onboard systems. More efficient computers are included in them and digital information transmission bus lines (systems) are widely employed, through which communication between the main functional units and the central onboard computer is accomplished. The data trasmission speed in such bus lines exceeds 1 million bits per second. It is noted, that they provide flexibility in the arrangement and organization of onboard systems, also convenient servicing.

Modern onboard computers possess large memories and rapid speed-of-operations. For example, the central computer of the F-15 tactical fighter has a memory capacity of 16,000 32-bit words and is characterized by a speed-of-operations of 300,000 to 400,000 operations per second. The computer of the F-20 aircraft has a memory of 64,000 16-bit words, which, as is noted in the foreign press, can be doubled. The speed-of-operations of this computer reaches on the average 648,000 operations per second.

The memory capacity provides the capability to implement a large number of alogriths in the programs, which can be refined and revised as necessary. Depending on the functional attributes, a similar mathematical support system

usually consists of several parts. For example, for the F-15 aircraft's computer, it is subdivided into 8 units, and for the F-18--into 15 units, or modules, among which is the navigation unit. For processing navigation information, a program is used which simulates a Kalman filter. It allows sequentially to estimate and make corrections to reduce mistakes in current primary data from various navigation devices and, as a result, to receive values of terrain coordinates, the aircraft's course and speed several times more accurately than without similar processing.

The onboard systems, operating on the basis of such computers, can, in accordance with the inserted program, automatically complete various functions in flight. For example, the sighting-navigation system of the ALPHA JET light ground-attack aircraft determines the aircraft's position, ground speed and spacial angle position; provides the output information necessary for automated flight control along the flight path, the correction of position coordinates along ground reference points visually and with the help of a laser range-finder: processes signals; computes sighting information; and determines vertical speed and altitude.

Autonomous and nonautonomous navigation system units are included in the onboard equipment, and on, several aircraft, they include mixed groups. For example, on the TORNADO tactical fighter, a reserve group consits of a gyromagnetic compass and attitude indicator. In case of a failure of the main navigation mode, when all this aircraft's system components are functioning, the automatic switching-on and use of the group is planned. The group initially comprises the Doppler navigator (DISS) and a platform with two gyroscopes, and when the DISS fails, the signal processing system of the same platform [is automatically switched on]. It is noted in the Western press, that in the main mode, air navigation errors do not exceed 0.9 km depending on the flight time. In the first back-up mode, the precision is deteriorated by a factor of 2-3, and in the second, approximately by a factor of 5, which still insures the return to the area of the airfield.

Inertial navigation systems, radars and Doppler navigators from the autonomous systems are used on tactical aviation aircraft. In addition, the signal processing system, attitude-and-heading reference systems, lasers, infrared and television systems, and radio altimeters are used, and for back-up, traditional systems-- a magnetic compass, gyrocompass and attitude indicator. The onboard units of nonautonomous systems are a device of the short range radio navigation systems (RNS) TACAN, LORAN-C and -D, the automatic radiocompass, and onboard units of the VOR, DME, and VORTAC systems and others, the radio communication transceivers. It is planned also to install the NAVSTAR satellite navigation system.

ON-BOARD AUTONOMOUS NAVIGATION SYSTEM DEVICES. As a rule, the onboard equipment includes inertial navigation systems (INS), for the time being mainly traditional mechanical ones, as for example, the AN/ASN-109 and the LN-31 on the F-15 fighters and the SKN-2400 on the F-16. They all support the flight along the flight route with an accuracy characterized by a circular error probable of not more than 1.80 km per hour of flight when displaying settings using the gyrocompass, which is completed in 10 minutes. During an emergeny take-off, the capability is envisioned for an accelerated settings

display, using the gyrocompass, of data presented on the windshield, and on some aircraft (for example, the "Tornado"), by using information remaining in the memory at the moment when the the navigation complex is switched off. The accelerated setting is accomplished in 1.5-2 minutes, however during this interval, the navigation precision of the INS is deteriorates approximately by a factor of 2-3 in comparison with the normal setting.

A great deal of time is required to set a mechanical INS, and this is considered to be its primary deficiency. In order to decrease this time and also the total weight of the INS, and increase their reliability, laser gyroscopes are being developed and issued now. They provide the same navigation precision as modern mechanical INS, but require only 1-3 minutes for a normal setting, approximately one-third the [previous] time. Only about 20 seconds, or one-fourth to one-fifth the time in comparison to mechanical INS, are necessary for the accelerated setting. It was reported, in particular, that the LN-90B non-gimbaled INS on circular lazer gyroscopes is being developed in the United States. As a result of this system's experiments on the F-18 fighter, the following of its characteristics were obtained: the circular error probable of determing an aircraft's position is less than 0.925 km per hour of flight, and a speed measurment error of 0.864 km per hour.

To temporarily halt the growth of the number of inertial sensors on aircraft (more than 35 of them on fighters), the U.S. Air Force started a program to develop and test a centralized multipurpose inertial sensor system. It is intended for its reliability to be 2000 hours (the mean time between failures for existing individual systems is around 240 hours), and the time for technical servicing per 1 hour of flight to be shortened by approximately 60 per cent.

Radars (RLS) are considered to be one of the primary units of the onboard navigation suites of modern foreign aircraft. Besides the detection of air and ground targets, and their tracking and sighting, radars operate in modes, necessary for navigation under zero visibility conditions. For example, the radar of the A-10 ground-attack aircraft will have modes for viewing the ground surface, correcting the inertial navigation system and supporting automatic flight with the curvature of the terrain relief at an altitude not less than 180 m. In this case, the terrain profile, lying ahead at distances of 1.85 and 3.7 km is reproduced on a display. It was reported in the foreign press, that automatic flight with curved terrain can be conducted at an altitude of 60-75 m in the F-11 fighter-bomber, using the AN/APQ-128 and AN/APQ-146 radars. The AN/APQ-63 radar of the F-15 aircraft attains an outline of the terrain with a fairly high resolution capability: for distances of 18.5, 37, and 93 km, it is 2.6, 5.2 and 12.6 m respectively. It is noted, that because of this, it is possible to observe armored personnel carriers, tanks and individual building-type targets. The mutipurpose AN/APG-66 radar of the F-16 fighter supports terrain map-making, orientation using beacons, distance measurement and a terrain view with a very high resolution capability. The maximum range scale for search in the improved variant of this radar is almost up to 300 km. The ANTELOPE-5 radar, which, along with an inertial platform, will support the navigation mode by comparing the relief of

the terrain being passed over with the information on the relief, placed in the computer memory, is being developed for the French MIRAGE-2000" aircraft.

Doppler navigators are installed on some aircraft: the AN/ARN-189 on the F-111 fighter-bomber, and the type 72 on the TORNADO, JAGUAR and HARRIER fighters. But multipurpose radars, such as the AN/APG-65, mounted F-18 HORNET aircraft, can function as a DISS. Using a DISS, the ground speed is determined with a relative error of 0.1 to 0.2 per cent, the drift angle-- 0.1 to 0.15 degrees, and the dead reckoning is determined with an error of 0.5-1 per cent of the covered distance.

The onboard equipment of almost all modern aircraft include laser systems for measuring distance, correcting position and targeting. For example, a type 105 laser unit can be used for target-designation on the A-10 ground-attack aircraft and the JAGUAR fighter-bomber, and on the HARRIER, a type 106 with an illumination of 8-15 seconds from the ground or other aircraft is used. The MIRAGE tactical fighters and the ALPHA JET light ground-attack aircraft may be equipped with the Swedish LRU laser range-finder. The angular spread of the beam rays does not exceed 2.4 degrees, and the range is measured within the limits from 160 m to 20 km with an accuracy of 4 m.

Infrared (IR) systems have been widely deployed. They are used for the search of air and ground targets, their sighting and tracking, and also for receiving a terrain image on the onboard display, necessary for orientation. For example, the AAA-4 IR system is installed on the F-4 "Phantom" fighter-bomber, and the AN/AAR-42 with a wider funtioning--on the A-10 ground-attack aircraft. In the U.S., Northrop is developing an IR sensor with solid-state matrixes of 16,384 detector elements. It is intended to be deployed in television cameras, which will allow them to be used not only during the day, but also at night.

IR systems fairly often are accompanied by lasers. In particular, PAVE TACK is such a system. Trials of the containerized systems for the F-18 (which includes an improved IR unit and laser range-rinder/target designator) and the LANTIRN1 for the F-16 and A-10 airfraft (with a terrain-following radar, IR unit and laser range-finder/target designator) are continuing.

Signal processing systems (SVS) are installed on all tactical aircraft. Using them, altitude is determined with the following errors: at low altitudes, 5-10 meters, and at high altitudes, 0.2 per cent of the measured altitude; air speed, with an error of +/- 4 km/hour; M number, with an error in the limits of 0.005-0.01. As is reported in the foreign press, for the purpose of standardizing the equipment, the U.S. Air Force started the development of a new series of standard computerized SVS. It is also reported, that as a result of the searches for more effective sensors, an onboard laser system is being developed in Great Britain for measuring true air speed along a zone for a distance of several hundred meters ahead of the aircraft, where a laser beam is focused. The beam, reflected in the zone from the smallest particles, is used by the system and is analyzed continuously for the purpose of determining the Doppler frequency shift, and according to it-- the true air speed (for the present within the limits of 1190 km/hour).

Television systems, such as the VAS-type, installed on TORNADO aircraft, or the AN/ASX-1 on the F-4, are used on many aircraft for improving visibility and target identification. With their help, due to the selection of sensitive components in a light receiver and a magnification of the image on a television display in the cockpit, a significant increase in the target detection range in, comparison with simple visual observation, is achieved. It is reported that the VAS system allows targets to be identified in daylight at ranges corresponding to the operational range of the English SKY FLASH missiles or at a distance of several tens of kilometers, and during a star-lit night, at ranges significantly exceeding the fire range of on-board enemy guns.

Various radioaltimeters, such as the AN/APN-194 on the A-10 and the AN/APN-203 on the F-15, are installed on all aircraft. To replace 13 types of existing radioaltimeters, the U.S. Air Force concluded a contract for the delivery of CARA standardized radar altimeters, initially for the F-16 fighters and A-10 ground-attack aircraft, and later for all remaining aircraft. The new altimeters are designed for altitude measurement in the range from 0 to 15,000 meters, with an average error of +/- 1-2 per cent and are highly reliable with a mean time between failures of 2,000 hours. The production of the ANV-12 digital radioaltimeter for military aircraft has begun in France. They permit measuring the altitude from 0-21,350 m with an accuracy of 0.305 m, or +/- 1 per cent.

ON-BOARD NON-AUTONOMOUS NAVIGATION SYSTEM DEVICES. Each aircraft of the NATO countries' tactical air forces has an angle-rangefinder unit of the TACAN short range radio navigation system (RNS), which operates on 252 channels in the decimeter frequency band. The AN/ARN-118 on-board unit has been adopted as standard. The system insures the determination of the bearing beacon with an error of 0.5-10 and the range to the beacon with an error of 60-600 m.

Small on-board units such as the AN/ARN-92 or AN/ARN-101 of the LORAN hyperbolic RNS can be employed on some fighters (such as the F-4, F-15 and F-16, and A-10 ground attack aircraft) as a back-up system. It allows an aircraft's position to be determined with a standard deviation of 100-400 m.

The AN/ARN-82 or the AN/ARN-87 unit of the electronic instrument landing system (ILS) is installed on tactical aviation aircraft, and the SETAC system device representing a combination of the onboard TACAN unit and a supplementary attachment can be employed on the ALPHA JET and TORNADO. In a homing mode on a ground beacon, the SETAC system provides the capability to determine azimuth with an error of +/- 30, and in a landing mode, 0.1 to 0.250. The range to the ground beacon is measured with an error of 20 m. The maximum operational range of the system is 57 km.

Automatic radio compasses (for example, the AN/ARA-50 on the F-15 fighter) continue to be used, allowing the course angle of ground radio stations with a precision of not more than 3-50 to be determined. These same units, support the use of the VOR and DVOR azimuth systems, the DME range finder and VORTAC angle range finder, working in the VHF range, at airports and along civilian airways. Direction finding of the VOR ground radio beacon can be done with an

error of +/-1.40, and the DVOR beacon--not more than 0.50, and the range to the DME beacon is measured with a standard deviation of 180-900 meters. With the aid of the VORTAC ground stations, range and azimuth are determined with an accuracy characteristic to the VOR and TACAN beacons. On-board communications radios, with the help of which orientation on ground radio direction-finding points is accomplished, can be used as backup navigation systems.

Foreign military specialists placed a great deal of hope on the NAVSTAR global satellite navigation system, which consists of three principal parts; space, ground control and the part which functions as separate navigation units of the user. Compact receivers with a volume not more than 100 cm3 are planned to be used as onboard units in the U.S. Air Force. The system receivers are intended to be installed first on the F-15 and F-16 fighters, and then on other tactical aviation aircraft. It is expected that when the entire system has been developed, the capability will exist to determine an aircraft's geographic coordinates with an error of 7 m, the altitude--10 m, speed--0.2 km/hour, time--10 micro seconds, and spacial coordinates with a true spherical error of not more than 16 m.

ONBOARD DISPLAY SYSTEMS. In the interests of increasing the effectiveness of combat operations and creating more favorable conditions for crew work, a great deal of attention is being paid abroad to refining display systems supporting the visual representation of information. For this purpose, instead of a great number of instruments, multi-purpose displays are used, and devices for controlling them and other aircraft equipment by vocal commands also are being developed. Information from various sensors can be displayed on the screens of multi-purpose displays as images of terrain from the radar, heat and television sensors, terrain relief, moving maps, the flight route and plan, the tactical situation, tables and various symbols.

Among other information, special significance is being given to the representation of a moving terrain map. Accordingly, (for example on TORNADO fighters), a projection unit is installed, which has a film reel containing maps with scales of 1:250,000, 1:500,000 and 1:1,000,000 for the entire European theater of war. In addition, several frames with a map scale of 1:50,000, for a possible target area, may be on the film. The combination display of the radar with the moving terrain map generates a map projection on the screen in one of three scales (1:63,360, 1:31,680 and 1:15,840) and provides the capability to superimpose radar information on tnis projection.

An electron-beam display, depicting information from a map on a mercator projection in the form of dotted and broken lines, is being tested for the MIRAGE 2000B fighter-bomber. In order to remove information from the film, a special unit is used which converts the map representation first into electrical signals, and then into the image of a map. It is reported that the resolution capability of the cartographic display, equaling 0.555 km, can be improved up to 0.37 km. Besides maps, the above-mentioned unit allows radar and alphanumeric tactical information, and also information concerning the flight path to be represented on the display.

Four electronic displays are installed in the cockpit of the F-18 fighter: the information depicted on the windshield, a radar and infrared system control, horizontal setting and a multi-functional [display]. A moving map with symbols is produced on the horizontal setting display using a 17.4 meter long 35- mm color film. Map photographs for a territory 10.3 million km2 on a 1:2,000,000 scale and 5 million km2 on a 1:500,000 scale can be stored on the film. In addition, in the middle of the film there can be up to 200 frames with information concerning the state of equipment and the flight modes. The entire film, apart from the controls from the inertial navigation system, can be rewound rapidly (in 10 seconds) and manually. It is noted that electronic displays on the F-18 are replacing the dials of a majority of flight instruments, and functionally duplicate each other. Due to this, the reliability of information is increased, and also the surface of the instrument panel is economized: on the average it is 40 per cent smaller than the instrument panel of the F-15, and half the size of the one on the F-4.

Instead of traditional displays with a field-of-view around 100, new ones, with difraction optics allowing the field of view to be increased 2-3 times are beginning to be deployed. For example, the displays which are replacing older ones on the A-10 and F-16 aircraft have a horizontal and vertical field of view of 250 x 200.

It is reported in the foreign press that an electronic display is being developed in the United States on which an aerial-perspective image of the terrain relief and obstacles ahead of the aircraft can be continuously recreated during flight, using information preserved in the unit's digital memory. Information on the terrain surface of 865,000 km2 was loaded into an experimental model for this. It was emphasized that similar units will be employed in pre-flight preparation for studying the terrain features along the route of the forthcoming flight and in the target area.

Flat-paneled color matrix displays, in particular on light-emitting diodes, pre-joined to square modules also are being developed urgently. Image polychromatism is achieved in turn by switching-on red and green diodes by impulses of variable lengths. It is considered that such displays can be used to represent the most diverse information: flight, navigation, status of the on-board systems and others. They are convenient to use and are distinguished by high reliability (the average mean time between failures, up to 11,000 hours). However, in spite of their distinct merits, reports are discussed in the foreign press that, at the present, matrix displays cannot compete with electronic ones. It is also noted that the U.S. Air Force command concluded a contract for the research of several display systems: for electron-beam tubes, flat panels on liquid crystals and light emitting diodes, and also projected with liquid crystal light gates. According to the results of investigations, for future fighters, it is planned to select a display system with one large screen in the forward part of the instrument panel, supporting the accomplishment of all functions, which at the present time are accomplished ty multi-function displays and control organs.

GROUND EQUIPEMT FOR NON-AUTONOMOUS ELECTRONIC NAVIGATION SYSTEMS. According to reports of the foreign press, the functioning of on-board non-autonomous electronic navigation system units during the flights of tactical aviation

aircraft in Europe currently is provided by an aggregate of a large number of mobile and fixed ground stations of the TACAN and LORAN RNS, and also the VOR, DME, VORTAC, DVOR, and SETAS beacons. In addition, homing radio stations and beacons and also radio direction finders are used. In the near future, it is planned to use ground equipment and satellites, which are part of the NAVSTAR system.

Ground TACAN RNS radio beacons, operating in the decimeter radio frequency band, are deployed usually near airfields and rarely far from them. Their maximum operational range exceeds 370 km. Presently, a great deal of attention is being paid to the use of mobile beacons, such as the M-6000 with one AN/TRN-26 interrogator-responder, which can be transported by C-130 or C-141 military transport aircraft and the MM-6250, having two interrogator-responders. Portable AN/TRN-41 beacons designed for parachute drops are rather widely used; their maximum operational range is 120 km.

LORAN-C RNS' ground stations' sphere of operations covers the North Atlantic, Scandinavia, part of Southern Europe and the Mediterranean. In Europe, the mobile LORAN-D system, consisting of three ground stations, supplements it. It is noted in the foreign press that all the equipment of a LORAN-D station, in spite of its bulk, can be transported by modern military aircraft and rapidly set up at a new place. The operational range of the stations is 600-900 km, and the highest accuracy for determining an aircraft's position, with a standard deviation of 25-30 meters, is provided in the middle of a triangle, formed by the arrangement of ground station points.

The VOR azimuth system's ground VHF omni-directional radio beacons and the DME range-finder systems usually are deployed at one place by an airport or at several points along civil aviation routes. The operational range of these beacons is within the limits of the radio horizon, but does not exceed 185 km. The operational range of Doppler ground stations of the Dutch DVOR azimuth system reaches 300 km.

According to foreign press evidence, there are landing and marker beacons for the instrument landing system (ILS) at almost all NATO military airfields. Course beacons operate in the metric wave (VHF) band, and glide-path ones in the decimetric wave (UHF) band. The deficiencies of this system are considered to be the sensitivity to signals reflected from surrounding ground targets and the support of an aircraft's descent during landing approach on the glide-path only with a constant inclination angle equal to 30. Presently in the United States in place of the ILS, the MLS system is being developed and adopted, with course and glide-path beacons which operate in the centimeter radio frequency band. In contrast to the ILS system, the MLS allows the descent to be accomplished during a landing approach along the glide path with an angle inclination up to 150. With time, it is planned to provide a descent during a landing approach along a curvilinear flight path.

Last year the SETAC West German instrument landing system, operating in the decimeter frequency range, began to be used. This system's SETAC-A course beacon and the SETAC-E glide-path beacon support a landing with a cloud cover altitude of 30 meters and a horizontal visibility of 360-400 meters.2

The NAVSTAR global satellite navigation system, now in full-scale development stage, is scheduled for completion in 1987-1988. Besides its ground stations, it is planned to include 18 primary satellites and several reserve ones, located in 6 12-hour orbits at an altitude of approximately 20,000 km. It is planned to launch the last satellites into orbit using the SHUTTLE multi-purpose spacecraft. The opinion is expressed in the foreign press that the NAVSTAR satellite system complex will be able, in the future, to replace existing ground-based radio navigation systems.

PREPARATION FOR FLIGHT AND ITS ACCOMPLISHMENT. Foreign military specialists consider that flight preparation must be automated to the maximum degree, and flight must occur with the most complete use of the capability of aircrafts' automatic on-board navigation complexes. The preparation for a flight usually begins by drawing up its flight plan, which, like the on-board computer's work program, can be written as a formalized chart. For many aircraft, it still is planned to write on perforated tape (for example, on the F-111 fighter-bomber) or on magnetic tape (the F-15 and TORNADO fighters).

It was reported in the Western press about the capability to accomplish the flight programming by the TORNADO's flight crew at a ground station equipped with a device with a special electronic table for flight maps, a digital computer, display unit, and a magnetic tape recording unit. It was noted that this device can be used also for any combat aircraft having a digital sighting-navigation computer. In describing the station's apparatus, it was mentioned that the electronic table has a built-in grid of fine lines on its surface which is connected with the computer and is used to produce data concerning the (course) cursor's position relative to the points of the table's surface.

During preparation for a flight, a map with the applicable flight path is placed on the electronic table. Then, the cursor is superimposed on any two map points, and then their coordinates (latitude and longitude) are initially imprinted and simultaneously fixed into the computer's memory. In this way, all remaining map points are joined to the earth's surface. After this, the cursor is superimposed in turn on points, corresponding to the main points of the assigned flight route, orientation check points and targets, and the coordinates of each are imprinted automatically by the computer and simultaneously fixed in the printing unit on magnetic tape. Simultaneously with the superimposing of the cursor on these points, information about the flight mode, including altitude, speed and other values, characteristic of it, are entered into the computer. On the basis of these data, the printer produces a full engineer-navigation calculation regarding the availability, required expenditure and navigation reserve of fuel, which may be preserved in the memory. The cassette, loaded from the ground station and bearing the forthcoming flight plan, is delivered to the aircraft and entered into the on-board computer's reception device in approximately 20 seconds.

The main navigation method is considered to be automatic flight along the flight route, the exit onto the target, flight to the holding zone or flight in it according to the program assigned before takeoff. The role of the crew actually amounts to assessing the tactical situation, monitoring the operation of the on-board systems, entering changes in the program, and

maintaining a readiness state for the rapid switch to the conventional (manual) accomplishment of the flight and combat mission.

PROSPECTS IN THE DEVELOPMENT OF ON-BOARD NAVIGATION EQUIPMENT. Judging by foreign press reports, the U. S. Air Force command intends to conclude a contract for the delivery, at the beginning of the 1990s, of a new-in-principle on-board communication, navigation, and identification system intended for future tactical fighters. This system, working on the principle of a time-sharing computer, can complete the functions of on-board devices, presently accomplished by various systems, including radionavigation, identification, landing and information distribution. According to specialists' calculations, the weight, overall dimensions, required power and cost of the new system will be 50 per cent less than those with subsystems included. In it, it is planned to use not a general computer, but arrays of processors with main-line architecture.

A sensor system complex is being developed in the United States for the purpose of hindering the rapid growth of diverse sensors on contemporary and future aircraft. It is planned to include finished units of the Joint Tactical Information Distribution System (JTIDS) as part of the on-board navigation suites being developed for the organization of planning and the command-and-control of joint combat operations by ground forces and fighter aviation. It is believed that one network of this system can support between 2 to 98,000 users, such as aircraft, command posts, air defense missile control posts, and others. Mutual communication, including the transmission and reception of information about the situation and operations of other subscribers, and also information about ground target coordinates, and enemy radioelectronic suppression and PVO systems throughout the entire TVD can be made available to them. The refinement of an aircraft's relative position will be accomplished on the basis of a kalman filter. With this, it is planned to compare the position assessment, received on the basis of time changes in the signal input, with estimates from other sources, for example, from the inertial navigation system. American specialists believe that this will allow information to be received about the coordinates with an insignificant error, measured in meters. In turn, JTIDS system subscribers can receive information concerning ground targets and enemy jamming and PVO systems from the Precision Location Strike System (PLSS).

Considerations are being expressed that cockpit equipment and, as a whole, the aircrafts' on-board equipment can support simpler and more favorable work conditions during flight preparation and in the process of its completion, which when given a sharp deficiency in personnel would allow a less-qualified flight and technical crew to be used.

1. For a discussion of the LANTIRN system see FOREIGN MILITARY REVIEW, 1984, No. 2, pp. 69-70.

2. For a discussion of the SETAC system see FOREIGN MILITARY REVIEW, No. 7, 1983, pp. 61-62.

9355
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USE OF CORRELATED SYSTEMS FOR AIR NAVIGATION

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 12, Dec 85 (Signed to press 11 Dec 85) p 66

[Article by Lt Col E. Sergeyev; "Use of Correlated Systems for Air Navigation"]

[Text] Presently, the aggressive NATO bloc country--participants' aviation specialists are conducting R&D work directed at increasing the accuracy of aircraft and helicopter autonomous navigation systems. On-board radar or radio-navigation systems are usually employed to decrease errors accumulated in inertial navigation systems. However, during flight at the lowest altitudes, especially over enemy territory, the use of these systems for air navigation is ineffective. To solve this problem, Western experts intend to include correction systems in the on-board navigation equipment, such as those already employed on American cruise missiles.

Such systems use the characteristic terrain features over which the flight route passes to determine the precise position of the aircraft. The essence of this correction method is as follows. The relief of any terrain section has its own peculiarities. By knowing the altitude profile along the flight route, it is possible to determine the position of the aircraft very precisely. The preparation of digital altitude profile maps of necessary terrain sectors currently is being accomplished using satellites, with the subsequent processing of space data on a computer. The flight route digital maps in recorded form on magnetic tape are entered into the aircraft's computer memory. During the flight, the system's radioaltimeter sequentially measures the relief altitudes and sends them to the comparison unit, where they are compared with the information retained in the memory. Simultaneously, the true position of the aircraft, in relationship to the assigned flight route, is determined and the deviation from it is measured. Depending on the degree of deviation, a signal is generated, which the aircraft's control system receives, to put it back onto the assigned track. Judging by foreign press reports, the accuracy for determining a position using correlation systems depends on the quality of the digitized terrain maps and can be several tens of meters.

The English firm British Aerospace is conducting flight trials of a similar navigation system on the F-16/79 tactical fighter, on which the TERPROM

(Terrain Profile Matching) correlation system device is installed. It is further intended to test it on the F-15 and HARRIER aircraft and on helicopters. The TERPROM system works in a complex with an inertial system, radioaltimeter and the aircraft's sighting-navigation display. To insure its functioning in the aircraft's maneuvering mode, when readings of the radioaltimeter will differ from the value of the true altitude, a ring antenna (around the fuselage) is installed on the aircraft, which makes it possible to determine the flight altitude reliably, even if the aircraft is inverted.

Information with a record of the digital altitude profile maps along the track and the flight program are loaded into the TERPROM computer system before take-off. The aircraft's position is determined continuously along the entire track, and the deviation from the assigned course line is represented on the sighting-navigation display. In the automatic navigation mode, a command to correct the deviation is sent to the aircraft's autopilot.

As foreign military experts consider, a navigation system using a correlation device allows an increase in the combat effectiveness of tactical aviation aircraft due to their more precise breakout onto the target at any time and during various weather conditions. At the same time, the more complete automation in the employment of aviation armament is possible. In addition to tactical fighters, correlation navigation systems are intended to be installed in the future on helicopters. The capabilities to autonomously determine their position and automatically breakout onto an assigned point with a high degree of accuracy allows search and rescue or assault operations to be conducted at practically any time, irrespective of weather, especially in mountainous terrain.

It is noted in the Western press that a similar navigation system may find wide application in transport aviation. Before take-off, the aircraft's crew inputs a digital map of the designated airfield region and an overlapping zone with a diameter of 180 km into the system's computer. Upon entry into this zone, the aircraft will breakout automatically onto a calculated point for a landing approach.

9355
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U.S. NAVY MINESWEEPING FORCES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 12, Dec 85 (Signed to press 11 Dec 85) pp 69-73

[Article by Capt 1st Rank V. Chertanov; "U.S. Navy Minesweeping Forces"]

[Text] In the U.S. planning for military preparedness, special attention has been paid in recent years to a growth in naval power. In this effort, great importance is given to the development and improvement of minesweeping forces, design and production of all types of modern naval mines, and development of ways and means to conduct "mine warfare." Outlays for construction of new minesweepers, procurement of minesweeping helicopters and mines have reached more than 2 billion dollars in the Reagan administration.

The post-war status of U.S. mine force development is linked to the sad (for the U.S.) experience of participating in their aggressive war in Korea (1950-53), when several American mine craft blew up on mines and sank. Obviously, this clearly demonstrated to them the vulnerability of surface ships to mines, the possibility of waging wide-ranging "mine warfare" in the future, and the necessity of developing and procuring new, more effective means of dealing with naval mines. In that period the U.S. developed a construction program for a large series of AGGRESSIVE-Class oceangoing minesweeps (MSO). In all, between 1954 and 1956, 58 minesweepers were built for the U.S. Navy and 35 for other countries.

Of that class, up to the present, only 19 ships remain in the U.S. Navy, of which only three--LEADER (MSO 490), ILLUSIVE (MSO 448) and FIDELITY (MSO 443) are in the active navy, and the rest are in the reserves. In the period 1957-1958, the U.S. constructed a small number of supplementary oceangoing sweepers along a slightly improved design (the ACME-Class): four ships for the U.S. Navy and seven for allied fleets, of which only two remain in the U.S. Naval Reserve force, AFFRAY (MSO 511) and ADROIT (MSO 509). Ocean minesweepers have a full-load displacement of 720-790 tons, speed of 14-15.5 kts, and a cruising range more than 3,000 nautical miles. They are armed with a 20 mm cannon (MK 68 or MK 24), SPS-53E/L surface search radar, the SQQ-14 sonar and sweeps of various types. A minesweepers' crew is 76-83 men (including seven or eight officers), of which, on the reserve ships, one-third are reserves. The ship's hull is of light wooden construction, the power plant, as well as all metal parts and systems, are made of rustproof, non-magnetic steel or bronze.

Ocean minesweepers are designed primarily for security of maritime shipping from the East and West coasts of the U.S., in the Gulf of Mexico and the Carribean Sea, and for destruction of any possible mine fields laid by an enemy in the channels and approaches to naval bases, ports and in assembly areas for convoys headed for Europe.

U.S. Navy lists include also 7 minesweeping boats (MSB) out of a series of 49 units constructed between 1952-56. These MSBs, displacing 40 gross tons (MSB 29 displaces 80 tons), wooden construction with a speed of 12 knots, cruising range of 360 nm and a crew of 7-11 (including 2 officers), can be transported to amphibious assault zones in the well decks of amphibious shipping. Craft of this type were employed extensively in the Vietnam War for sweeping rivers and canals. They carry several machineguns.

Combat experience in the aggressive wars in Korea and Vietnam led to a basic awareness that new ways and means of mine warfare involved using helicopters to tow trawling gear. The RH-3D, the first to be specially designed for these tasks, was quickly replaced by a reconfigured amphibious transport helicopter, the CH-53D SEA STALLION. A squadron of these helicopters (HM-12) was formed in April, 1971, and in the period from November, 1972, to July, 1973, it took part in mine clearance operations in the coastal waters of the Democratic Republic of Vietnam (Operation ENDSWEEP). Later, in April, 1974, and in July, 1975, the squadron was detached for mine clearance operations in the northern portion of the Suez Canal (Operation NIMBUS STAR and NIMBUS STREAM, respectively). With the entry into the U.S. Navy of the specialized RH-53D helo-sweepers (in all, 30 aircraft, based on the CH-53D), the squadron was re-equipped with these helicopters and in 1978, reclassified as a combat training squadron. In that year two more helicopter-minesweeper squadrons (HM-14 and HM-16) were formed and placed on the active Navy list. While HM-12 had only five RH-53Ds, both HM-14 and HM-16 had eight each. In addition, nine copters were utilized for continuing test and evaluation. As a result of these organizational measures and, in accordance with the decisions of the naval staff (Project 60), so-called airborne minesweeping forces were established along with concepts of integrated employment of minesweeping ships and helicopters in mine warfare.

In April, 1980, seven of the eight RH-53D helicopters from the carrier NIMITZ (CVN-68), in the course of diversionary operation to rescue American hostages in Iran, were lost (one burned as a result of a collision with a C-130 transport during takeoff and six, including four in working order, were abandoned by the crews). In 1983, HM-12 received five new helicopter-minesweepers, conversions from the new, more powerful transport helicopter, CH-53E, SUPER STALLION. In August, 1984, units of HM-14 took part jointly with British and French sweepers in the Red Sea clearance operations.

In the U.S. Naval command's opinion, airborne minesweeping forces maintain substantive advantage over seaborne units: a potential for rapid deployment to practically any theater of military activity (including movement by military airlift C-5A GALAXY), and a higher tempo of operations. They can be employed from amphibious helicopter carriers, small airfields and landing zones on unequipped beaches. Also, helicopter-minesweepers, when not

employed in their primary role, are capable of solving problems of combat and rear security, carry out rescue operations and other work.

The maximum lift weight of the RH-530 is 2,680 kg; its speed when towing trawling equipment (depending on type) can reach 15-27 kts, fuel capacity in internal and suspension tanks permits a 4-hour trawling period, the special towing rig is stressed for up to 9,000 kg. The helicopters are equipped with different types of sweeping gear:

contact (MK 103);

acoustic (MK 104);

electromagnetic (MK 105 or SPU-)1, and;

combinations (MK 106).

Some aircraft can be equipped with 12.7-mm machineguns for destruction of floating mines. Detection and classification of mines is accomplished with the aid of AN/AQS-14 and AN/ALQ-141 towed side-looking sonars.

Minesweeping helicopters can operate as a squadron (up to six aircraft). Command and control of flights is conducted from a radar observation post ashore or onboard ship.

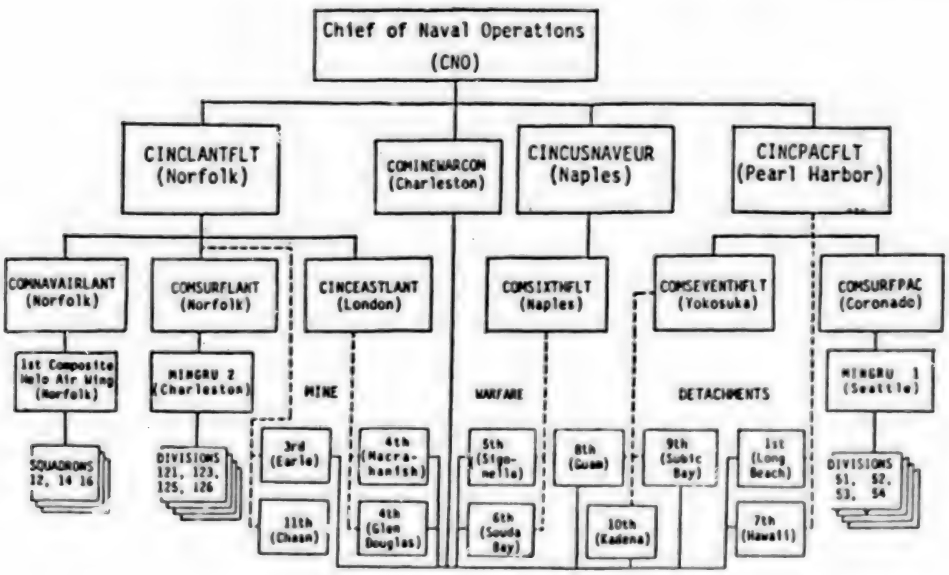
Until 1975, minesweeping ships organizationally came under the type command of the Atlantic or Pacific Fleet Mine Force. Later, they were reorganized, and the tactical units--MINRONs 5 and 12--were transferred to the surface force command and were renamed respectively MINGRUs ONE and TWO.

MINGRU TWO (LANTFLT, with a staff at NAVBASE Charleston), includes four divisions: the 121st, 123rd, 125th, and 126th with two to four ships each. In all, there are 12 ocean minesweepers in MINGRU TWO, including 10 in the ready reserve, and 7 minesweeper craft (125th DIV), which are based at Charleston, Newport, Mayport and Little Creek. MINGRU ONE (PACFLT, with a staff at NAVBASE Seattle) consists also of four divisions (51st, 52nd, 53rd and 54th. All nine ships of MINGRU are in the reserve fleet, based at Seattle, Takoma, San Francisco and San Diego. Three squadrons of minesweeper helicopters (the 12th, 14th and 16th) are assigned to the 1st Composite Helicopter Air Wing of the Atlantic Fleet Air Forces based at NAS Norfolk.

Currently, with the disestablishment of the mine force type commander in the U.S. Navy, a central Mine Command was established (directly subordinate to the CNO). It is responsible for coordination with Fleet Commanders and with Commander, Naval Forces Europe, and with the wide range of navy staffs on all manner of questions related to combat readiness, preparations, tactical methods of combat use of mine forces and mines from surface ships, submarines and aircraft as well as technical aspects of fitting out the fleet with mines and countermine weapons.

The Mine Command (COMINEWARCOM) commands a mobile group of mine armament which consists of 11 detachments, deployed in forward and rear areas of maritime

theaters and subordinated operationally to the responsible fleet commander (See figure). The group and its mine warfare detachments are designed to ensure readiness of mines in storage in the event of war, and for their ultimate readiness for operational use in accordance with war plans of the Fleet CINCS and CINCUSNAVEUR. They are also responsible for training and military preparedness. For this purpose, special mine personnel from these detachments can be assigned, when mining operations are being carried out, to detachments and to fleet units (usually aircraft carriers).



U.S. Navy Mine Force Organization
(solid line indicates administrative subordination, dotted line, operational)

The U.S. Navy mine inventory consists of three basic types:

--homing, antisubmarine, and the deepwater MK 60 CAPTOR (placement depth to 800 m) torpedo-mine, laid by airplanes, surface ships and submarines;

--an advanced bottom non-contact mine for medium (up to 300 m depth, the air-dropped QUICKSTRIKE, for use against surface ships and submarines; and,

--the mobile bottom mine SLMM MK 67, laid in shallow (100 m) depths from submarine torpedo tubes.

As reported in the foreign press, in 1982, the QUICKSTRIKE mine inventory in the U.S. consisted of 80,000 units and, from 1984-88, it is planned to procure 600-700 of these mines annually. MK 60 CAPTOR mines are being delivered at a rate of 300-500 a year and the SLMM MK 67 - 200-300 annually. In addition, procurement of MK 36, 40 and 41 mines continues and several types of obsolete mines (MK 52, 55 and 57) remain in the weapons inventory.

According to information in the foreign press, in its prospective plans for development of the Mine Force, the U.S. Navy is proposing to construct new mine ships: 14 AVENGER-Class (MCM) and 17 CARDINAL-Class (MSH). The lead AVENGER-Class ship was laid down in 1983, and should be turned over to the navy by the end of 1985. Planning calls for completion of the entire AVENGER-Class by 1990. Authorization for constructing the CARDINAL-Class lead unit was received in FY 84, its construction is expected to be completed in 1987, and the entire class by 1992. These new mine countermeasures ships displace 1,040 (MCM) and 400-500 tons (MSH), they are expected to be fitted with new variable depth sonars (VDS), either SQQ-32 or SQQ-30, wire-guided destructors (MNV), and new SPS-64 radars. The CARDINAL-Class hull will come in two variants: air cushion and standard displacement. At the same time, the AVENGER hull (wood and fiberglass construction) will be similar to those minesweepers currently in the ocean force. They will be diesel powered, with a 5 kt maximum sweeping speed. Upon completion of construction, 8 AVENGERS and all 17 CARDINALS will be transferred to the reserves.

Airborne mine forces will receive further improvement through introduction of a new minesweeper-helo, the MH-53E, based on the CH-53E. Authorization for procurement of these helicopters was approved in the FY 85 program, and it is proposed that 44 of these machines will be acquired. Fleet introduction is expected in 1987. Simultaneously, it is planned to form up one RH-530 squadron in the Naval Air Reserve.

In order to achieve the above-mentioned capabilities, aimed at improvement of U.S. Navy MINEFORCE capabilities and pursuant to special programs for anti-mine defense of naval bases and ports, the U.S. foresees mobilizing and equipping a considerable number of fishing vessels and small tonnage commercial ships during periods of threat of war.

The pseudo-defensive character, which in the West they are trying to give to their programs of "improved" mine capabilities, does not hide the true aggressive intent of the U.S. toward the USSR and countries of socialist cooperation. It is no secret that the American high naval command is intent on applying its primary efforts in the war against mine hazards toward the destruction of mine-carrying units even before their departure for designated mine implant areas, and consequently, applying efforts toward continuing the construction of even newer, considerably more costly, high effective combat ships and aircraft, equipped with all kinds of the most modern strike weapons.

9355
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ITALIAN NAVY OPERATIONAL, COMBAT TRAINING ORGANIZATION

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 12, Dec 85 (Signed to press 11 Dec 85) pp 76-77

[Article by Capt 1st Rank S. Vladimirov; "Italian Navy Operational and Combat Training Organization"]

[Text] The Italian military-political leadership is one of the most active members of the aggressive NATO bloc. During their militaristic preparation for war against the USSR and the other socialist countries, along with equipping their armed forces with the newest weapons and combat equipment, they are paying serious attention to the training of their national navy for conducting combat operations in the Mediterranian Sea, both independently and as a part of the Joint NATO naval forces in the Southern European TVD.

As reported in the foreign press, plans call for conducting a large number of large-scale operational activities in the Mediterranean Sea, including exercises along national plans, jointly with several NATO countries' navies and also in accordance with NATO plans.

The principle naval exercises being conducted along national plans are squadron exercises under the code name MARE APERTO, which are conducted four times a year. Their purpose is training for operations as a part of Joint NATO naval forces in the South European TVD. During these exercises, they work out tactics to be used by task groups and units; execute "raid" type assault landing operations with the landing of a "San Marco" marine battalion; interact with national air forces' tactical aviation and command and control E3-A AWACS aircraft to organize shipboard air defense at sea and the conduct of strikes on naval targets; use shore-based patrol aircraft and shipborne ASW helicopters; conduct practical gun and missile firings at air, sea and land targets.

Exercises of this type usually include 2-3 guided missile cruisers, up to 4 guided missile destroyers, 3-5 guided missile frigates, 2-4 subarines, 1-2 frigates, 2-4 corvettes, 2-4 hydrofoil missile boats, 1-2 general-purpose combat stores ships, 1-2 tank landing ships, up to a battalion of marines, shore-based patrol aircraft (they fly up to 300 hours in a single exercise), ASW helicopters (they fly about 300 hours in a single exercise), and also 30 tactical aircraft per exercise. The overall leadership of forces is carried

out by the squadron [fleet] commander and direct [control] by the formation commanders. The duration of a MARE APERTO-Type exercise, which is usually conducted in the Tyrrhenian and Ionian Seas, is from two weeks to a month.

Additionally, the Italian Navy, during a year, conducts about 30 individual tactical exercises, including FOLAGA, OTTOBRE, MARE ALPHA, GAZTEKS, PROSIVEKS, EDICT, and VENETO. Corvette- and frigate-type ships are used to perform patrol duties in the Tyrrhenian Strait [sic] and complete about 180 sorties per year, during which they use up to 15,000 hours of service life [of the ships]. Additionally, the expenditures of these ships' service life for providing commanding officer training for naval academy students reaches 1,000 hours per year. ASW helicopters also patrol the Tyhhrenian Strait, flying 330-350 hours annually. Minesweepers are periodically called upon for short-time patrols in the Adriatic Sea.

As reported by the foreign press, participation in the country's armed forces annual command-staff UNA ACHIES exercise in the highest form of operational training for the Italian Navy according to national plans.

During the year, the Italian Navy command conducts one large-scale TRIDENT- or SARDINIA-Type exercise which includes ships, naval aviation and marines of the U.S., France, Great Britain, Spain, and Greece. On the whole, up to 30-40 major-class ships and missile boats of the NATO countries can participate in it. In turn, Italian shore-based patrol aircraft participate in joint exercises conducted by the navies of Greece (NIRIIS, ANAPNESTIR), Spain (TAPON), France (OLIVE NOIR) and others. Usually, 1-2 guided missile frigate- or cruiser-type ships and several shore-based patrol aircraft (in one exercise, up to 80 hours are flown) are allocated for this.

The most intensive operational and combat training of organs for the control of Italian naval ships, aircraft, naval aviation and marines is conducted in accordance with NATO plans. The Italian fleet participates in practically all the bloc's Mediterranean exercises such as DISPLAY DETERMINATION (a joint NATO naval exercise in the southern European TVD), DOG FISH (submarine forces), DISTANT DRUM or DISTANT HAMMER (strike and joint NATO naval forces in the southern European TVD), DAMSEL FEY (minesweeping forces), LOCKED GATE or OPEN GATE (blockade of the Strait of Gibralter), DETERRENT FORCE (combined NATO naval exercise for action to a "challenge"), and also SEA SUPPLY (command-staff exercise in the southern European TVD to establish control over navigation by enlisting the participating countries' civil ministries.

The most significant Italian naval forces are assigned to the DISTANT DRUM- or DISTANT HAMMER-type exercises, which are conducted alternately. About 20 Italian combatants as well as naval aviation usually take part in these [exercises]. On the average, participation in DISPLAY DERTERMINATION- and DOG FISH-Type exercises is ten surface ships and submarines, in DAMSEL FEY, up to three ocean and coastal minesweepers (minesweepers and mine hunters), in LOCKED GATE or OPEN GATE, one frigate. During the year, one frigate is assigned to joint NATO naval forces for "challenge" operations and for participating in the DETERRENT FORCE-Type exercise.

The foregoing information concerning Italian naval organization of operational and combat training is evidence of the fact that the Italian Fleet is used actively by the NATO bloc and the country's military-political leadership, by and large, for achieving the aggressive goals of the North Atlantic Alliance in the Mediterranian Sea area and for supporting the West's imperialistic ambitions.

9355
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FRG SHIPBOARD ELECTRONIC WARFARE SYSTEMS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 12, Dec 85 (Signed to press 11 Dec 85) pp 78-81

[Article by Capt 2nd Rank (Res) F. Voroyskiy; "FRG Shipboard Electronic Warfare Systems"]

[Text] The West German (FRG) Naval Command, intent on increasing their naval power, are paying special attention to shipboard installation of electronic warfare (EW) systems. However, it was only at the beginning of the 1980s that their ships were equipped with EW systems imported preferentially from NATO countries (excluding signals intelligence systems and apparatus for passive radar countermeasures installations and infrared jamming, which were built in the 70s). But now, according to the foreign press, FRG industry has begun to produce indigenous shipboard EW systems. Of the many signals intelligence equipments, the most widely used system is the TELEGON radio direction-finding (RDF) equipment (which by 1985, had been modified ten times).

By way of example, take the RDF TELEGON-8 which was introduced in 1979, and began series production in 1982. It is of modular construction and in different variants of complexity can be employed on ships, aircraft and land-going transport systems. The RDF (frequency range from 10 kHz to 30 MHz) can locate shore and shipborne transmitters with an accuracy of +/- .30. Its working frequency range is broken into 56 bands. Receiver band width (intermediate frequency) can be set at .1, .3, .6, 1.5, 3.0, 6.0 and 10 kHz. Arrangement of data indicators on the CRT presents information either analog or digitally, there is also a volume control channel.

The RDF is computer-based, which insures control of all beams, receiver calibration, bearing error correction, automatic check of equipment working condition and transference of data into digital form and storage.

The computer aids in antenna deployment and coordinates sensitivities of antenna elements. Special attention is given to error correction, arising from reradiation from one's own ship's superstructure. Prior designation of phase and amplitude mixing from each of the bands is input into the computer memory in order to work out errors in the received bearing. The memory structure of the computer stores and provides the operator information on 30 separate frequencies.

TELEGON-8 can work jointly with TELEGON-9. A single command and control post is used and search can be conducted in the frequency range from 10 kHz to 1000 MHz.

Basic characteristics of RDF equipments in the FRG Navy are given in Table 1.

Table 1

Principal Characteristics of German Navy RDF Equipment

NAME OR DESIGNATION	FREQUENCY RANGE	BEARING ERROR IN DEGREES	RESOLUTION CAPABILITY
FT001	25 MHz - 1000 MHz	up to 1	up to 100 Hz
EZF/EZFU	6 kHz - 2700 MHz	-	1 kHz
ASDF	-	about 0.2	-
TELEGON-9	20 MHz - 1000 MHz	up to 0.3	100 Hz - 10 kHz (depending on the operating mode)

Besides signals intelligence systems on FRG warships, they also have radar reconnaissance (RTR) installations, early warning receivers, active jamming systems (SAP), combined RTR and SAP installations and systems for passive radar detection and infrared jamming.

The RTR FL400A, made by Telefunken, is of modular construction and designed for application throughout all the armed forces. It is installed on smaller ships (including special assignment units), aircraft or in tractor-trailer type vehicles. In Telefunken specialists' opinion, the high degree of automation and the simplicity of operations allows it to be run by personnel with low qualifications.

The station operates in the range from .5 to 18 GHz, with capability to expand to 40 GHz. It detects radar signals, measures their parameters and automatically with the aid of a computer identifies the source of the radiated signal. Information received is displayed on a screen in polar coordinates in alpha-numeric format. Because of the need for follow-on analysis, received signals are recorded on magnetic tape.

The receiving systems consist of a high-sensitivity, superheterodyne receiver, connected to a directional parabolic antenna and combined with a panoramic receiver indicator displaying multiple frequencies, and working with an omnidirectional antenna.

The FL400U Radar Warning Receiver (Telefunken) operates in the same frequency range as the FL400A. It carries out search and identification of fire control radars and guided missile radar seekers. In addition to warning, the receiver can be used as well to control jamming emissions. It operates semi-

autonomously and can be run by a single operator. Its computer stores parametric information on all known enemy radars as well as the units on which they are installed.

In the category of similar designated equipment for shipboard use are also combination systems providing warning from radar and laser ilumination, designed for military transport defense. Radar/laser receivers have a 3600 field of view in azimuth and 700 in elevation. Bearing accuracy of the system is 60 and 30 respectively. Radar/laser designations data in range and target designation are displayed on a single screen.

The multimode active jamming system (SAP), FL400G from Telefunken, operates from 7.5 to 17.5 GHz and is employed in conjunction with the FL400U. It incorporates a stationary omnidirectional antenna system, a terminal power amplifier (traveling wave tube), a modulator and a central computer which assures connectivity with the FL400U. Effective radiated power of the system, in proportion to antenna directionality, is 20 to 60 KW. The type of jamming is specified according to the type and mode of enemy radar radiations. Emission of noise and manipulative interference is possible in range and bearing coordinates.

Effectiveness of suppressing enemy radars is controlled at the FL400G station. Toward this end, the system works out the pulsing scheme, switching the jamming transmitter off for short periods of time. The FL400U operates in the intervals between jamming pulses and continuously corrects system output in terms of directionality and frequency. If, at this point, the (enemy) radar shuts down or changes operating mode, then the jamming emissions will stop and a corresponding advisory will appear at the operator's console.

The FL1800S signals intelligence (RTR) and jamming complex operates in the frequency range from 7.5 to 17 GHZ, covering 5 bands. The FL400A RTR is used as a receiving system with a dual antenna configuration: one channel for specifying the direction of the radiation source and a second channel for frequency determination (omnidirectional). The antenna channel for direction specification is single-pulse, stationary, and includes four identical antenna elements, each of which covers a 900 sector. In one element there are five antenna components, corresponding to the number of bands. All antenna elements of the frequency determination channel (and for each of the bands) are joined together in detached structures, hidden by radiotransparent radomes in the shape of a truncated cone.

The active jamming equipment is connected to an antenna system which, like the direction designation channel of the RTR, has four antenna elements (each covering an azimuth sector of 900), which allows a choice of sector for jamming signals in a 3600 coverage.

According to the foreign press, on the BREMEN-Class guided missile frigates, there are the following antenna installations:

--Frequency determination channel (disposed on a short whip mast atop the forward bridges behind the DA-08 radar mast;

all other receiving antennas;

--Active jamming systems (two by two on consoles on the sides of the air search radar antenna mast on both the starboard and port sides.

The control system consists of a central computer, which controlls processing of received signals and creates jamming signals; junction boxes into other shipboard systems; and an operator station, designed for operation under normal conditions by one operator and in stress, by two.

The FL1800S RTR system can provide target designation to shipboard fire control systems. On BREMEN-Class FFGs it is tied to the shipboard SATYR NTDS system which is provided data on bearing to the units carrying the detected radars. If the target is classified as an anti-ship missile, target designation shifts to the anti-aircraft fire control system which can fire a volley of two missiles.

The FL1800S system in conjunction with the third generation NTDS, SATYR-103B (on DDs) or AEGIS (missile boats), is installed on the modernized (in 1982) destroyers MELDERS and ROMMEL, missile boats of Project 143 and other surface ships.

All the above-detailed means of signals intelligence and jamming are designed for individual ship defense.

Installations for passive radar and infrared jamming have been developed for FRG Navy and other NATO ships, and are represented in three types, the characteristics of which are displayed in Table 2.

The SHALMAY system, developed by Telefunken, is designed to defend small and medium displacement ships (patrol craft and minecraft) from anti-ship guided missiles with radar or infrared guidance systems. It consists of eight launchers (four on each side), a fire control system (a basic and a backup control station in the ship's CIC) and control gear. Chaff can be laid manually from the control station, and semiautomatically according to predesignated programs input into the control equipment. In the first case, the number of launchers and the guide rail to lay a chaff field are selected manually; in the second mode, only the program and start time of the chaff launch is selected.

Each launcher is a container with 10 guide rails in two rows for the unguided missiles--chaff carriers. On shipboard installations the angle of elevation can be modified within the range from 130 to 630 and the direction of the plane of fire (in a 50 swath) is from 0 to 1100 off the ship's heading.

The nonguided rockets with solid fuel engines are equipped with dipolar reflectors made of aluminized fiberglass, designed for effective operation in the 4-40 GHz waveband, or with infrared radiations emitted after descent of the rockets on parachutes. In addition to the standard 560 mm rocket, an 800-mm rocket with a dual load of dipolar reflectors can be employed.

Table 2

Principal Characteristics of Shipboard Systems for Establishing Passive Interference in the FRG Navy

System Name	No. of Launchers / No. of Launchers	Launcher wgt, kg / Cell Size, mm	Missile Caliber, mm / Length, mm	Missile wgt, kg / Projectile wgt, kg	Time to Form False Target (sec)
SHALMAY	8 / 10	40 / -	70 / 560	2.5 / -	-
HOT DOG	4: 8 / 4	82: 145 / 130X600X300	76 / 100	0.74 / 0.41	2
SILVER DOG	4: 8 / 3	82: 145 / 130X600X300	76 / 100	0.95 / 0.45	2

The HOT DOG/SILVER DOG passive jamming system was designed and since 1979 has been produced by BUCH CHEMISCHE-TECHNISCHE and VERMAN for smaller FRGN ships to protect them against IR and radar guided missiles. The system gets its name from the type of non-guided rocket; infrared decoy--HOT DOG; radar interference (chaff)--SILVER DOG.

The system has four launcher-dispensers with 12 or 24 trainable tubes and a primary as well as a back-up fire control station. Each dispenser appears as a box-like frame with three guiderails mounted on each. It fires the above-mentioned types of missiles. The chaff rows are set up either by single shot launch or by voleys.

Judging from information in the foreign press, the FRG Navy, in addition to designing radioelectronic combat systems, is looking ahead toward measures to enhance ship security and concealment by techniques of limiting effective surface scatter in operating radar frequencies.

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1985 INDEX OF ARTICLES: FOREIGN MILITARY REVIEW

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[Text] ITEM ISSUE

GROUND FORCES

AIR FORCES